VOLUME XXV NUMBER FIVE

THE NATIONAL GEOGRAPHIC MAGAZINE

MAY, 1914

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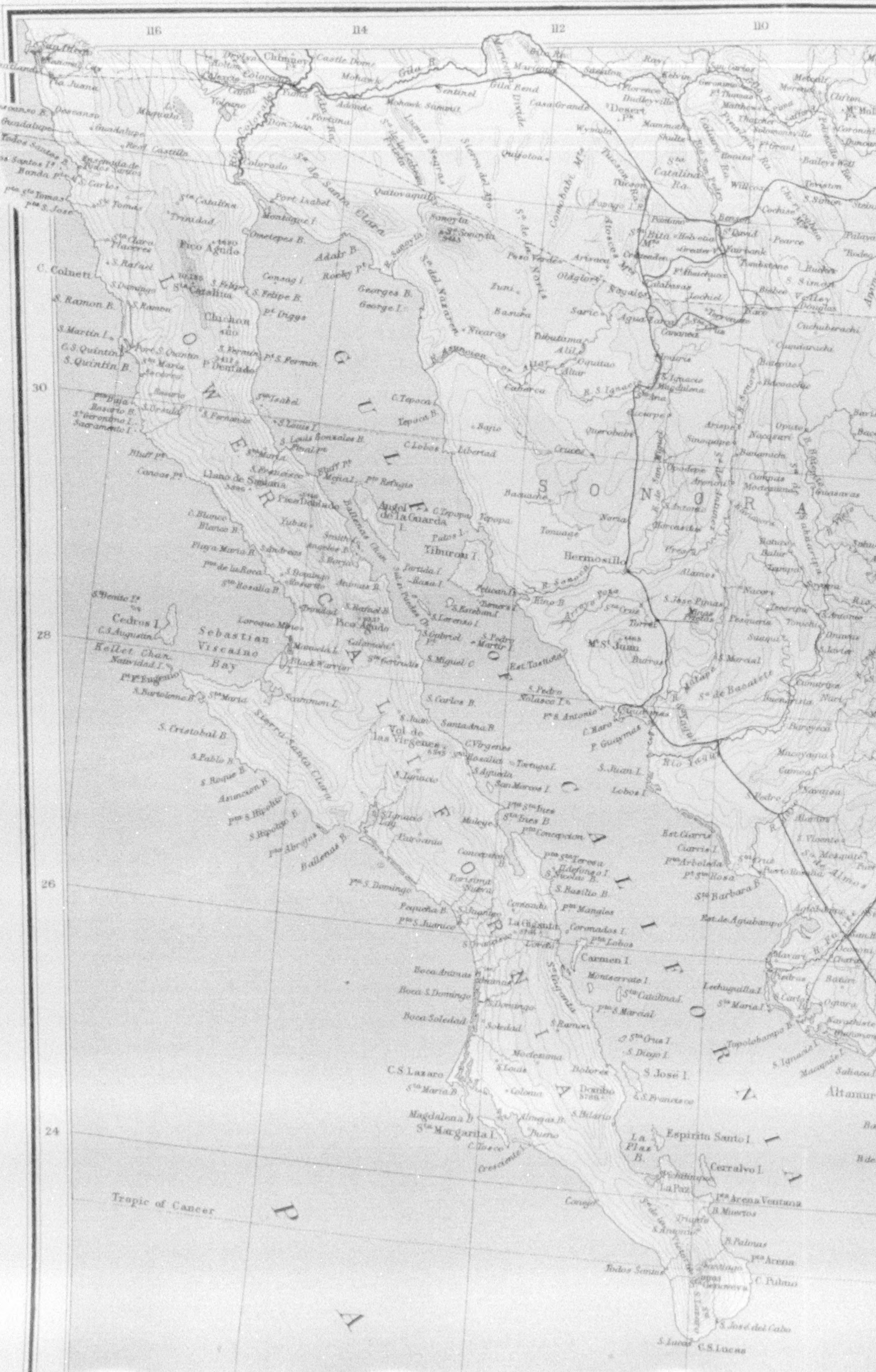
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Quijotoa
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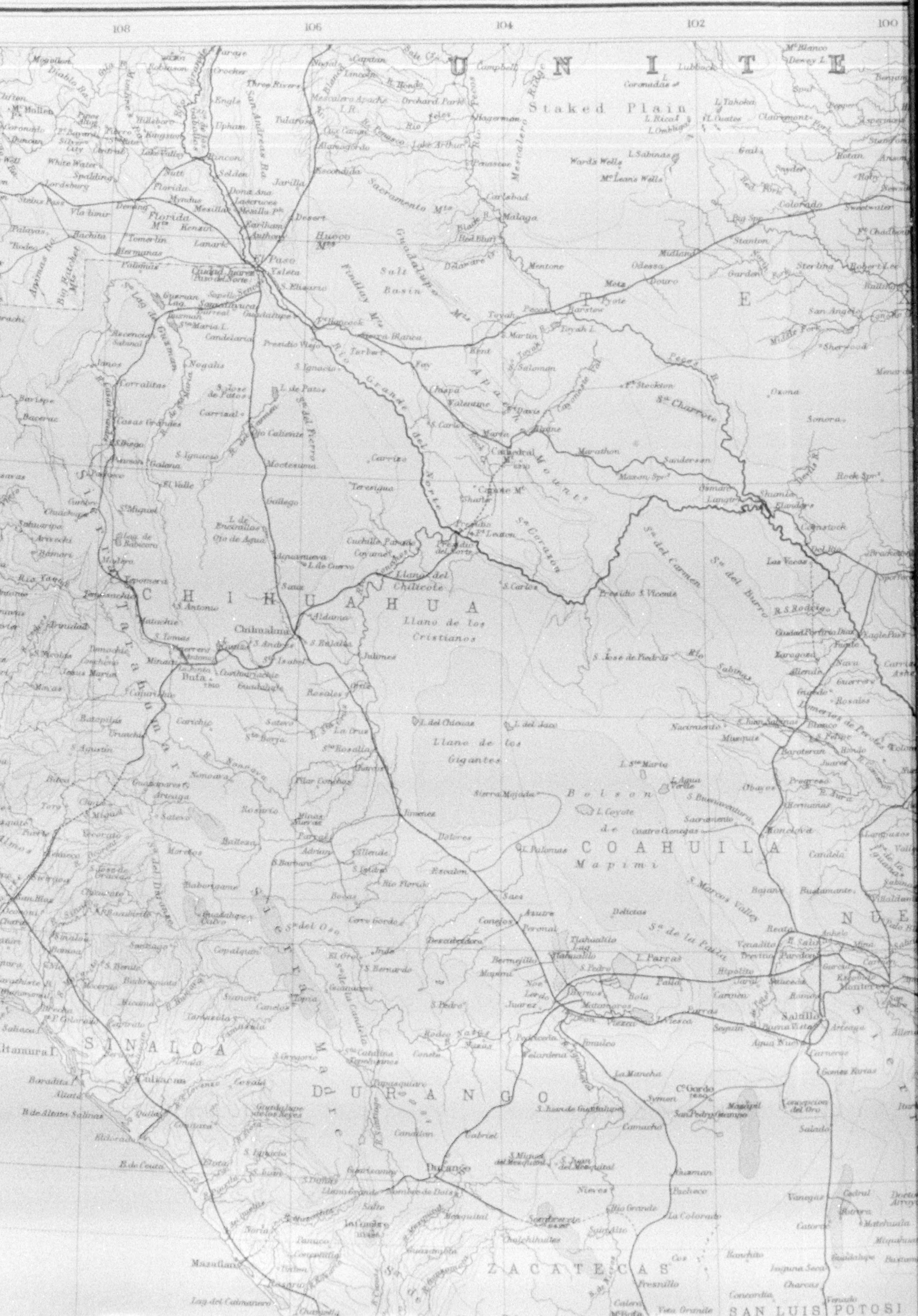
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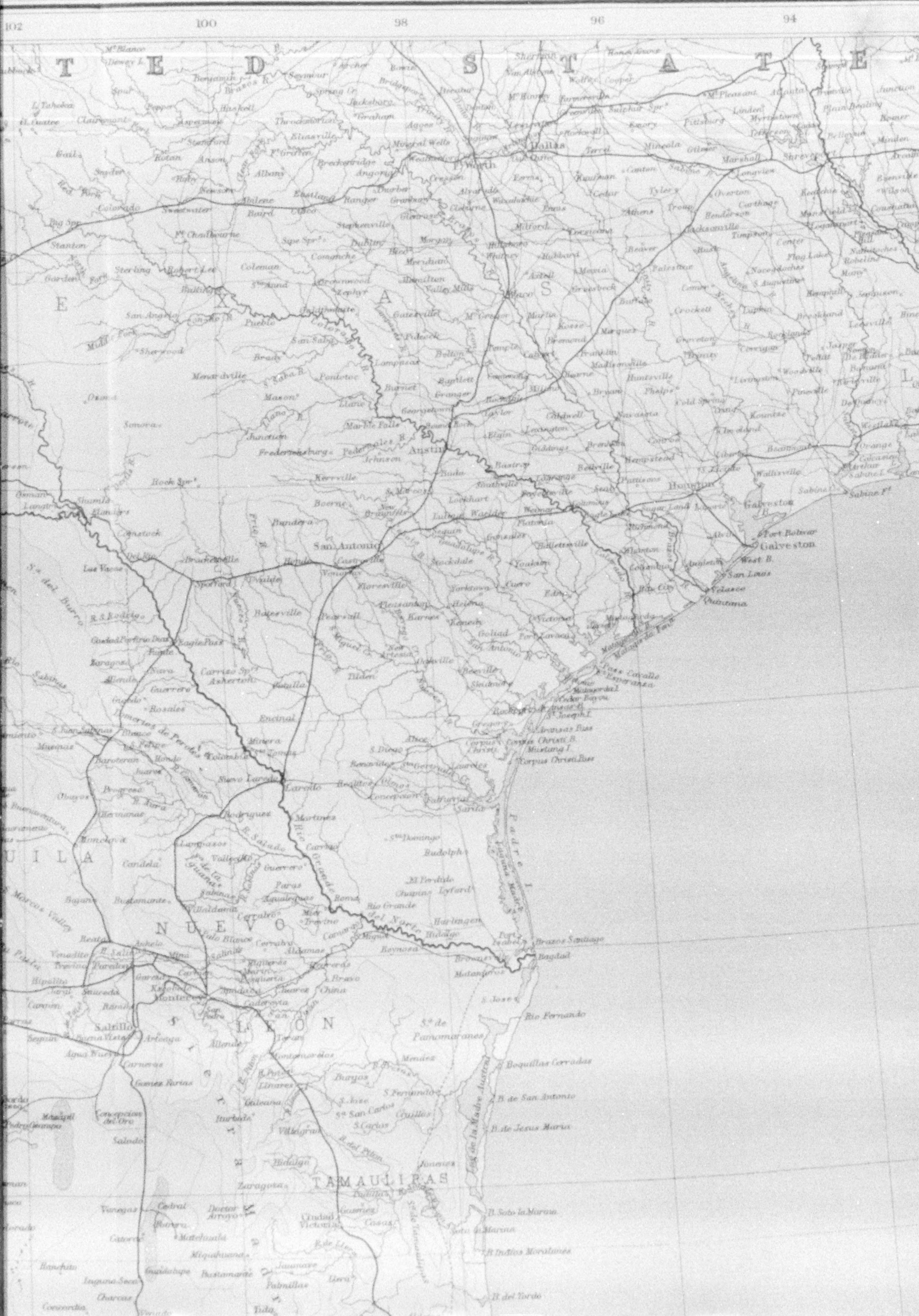
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Sn Carlos
Cruillas
Burgos
Mendez
Sn de Pamoranes
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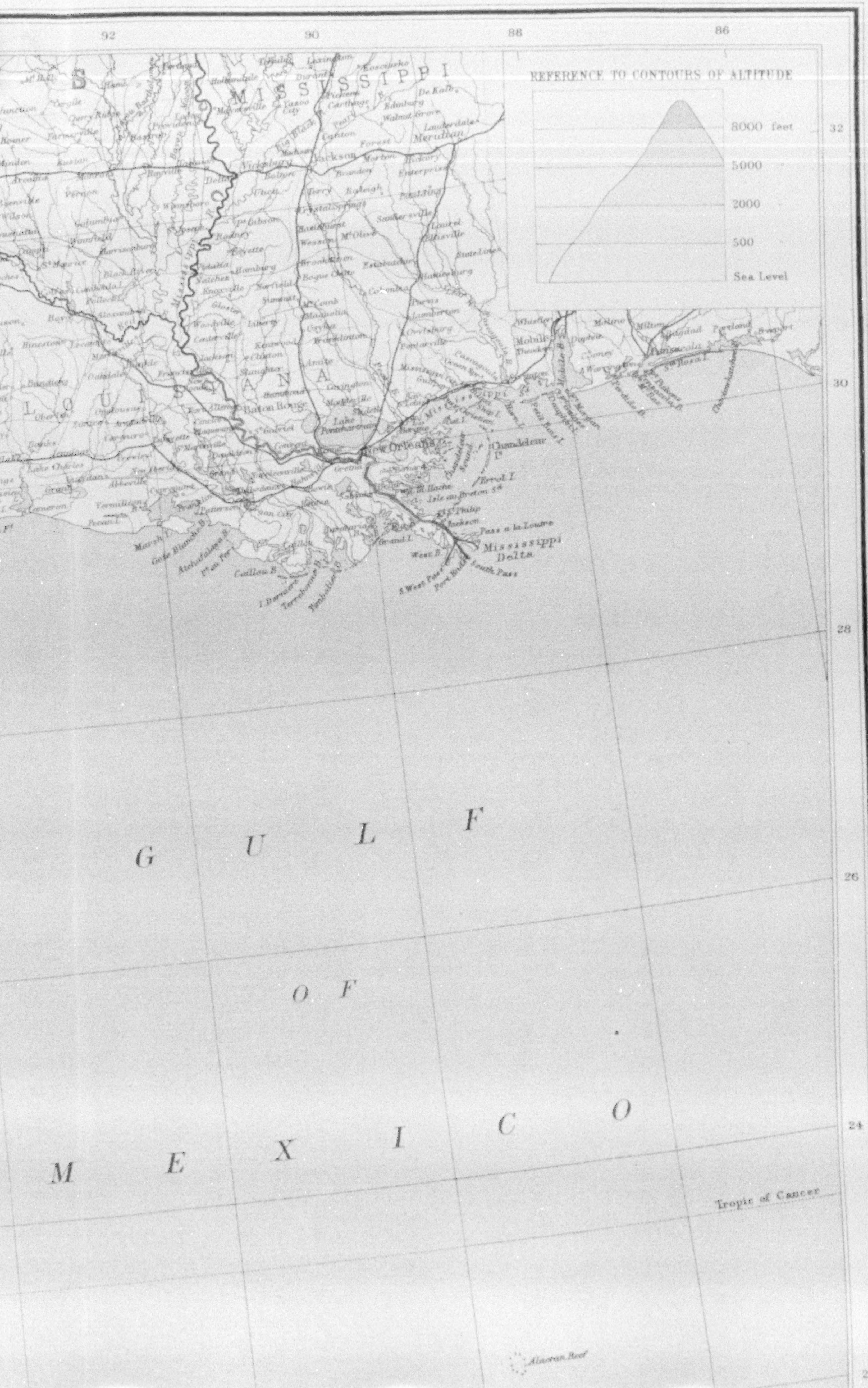
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REFERENCE TO CONTOURS OF ALTITUDE
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LOUISIANA
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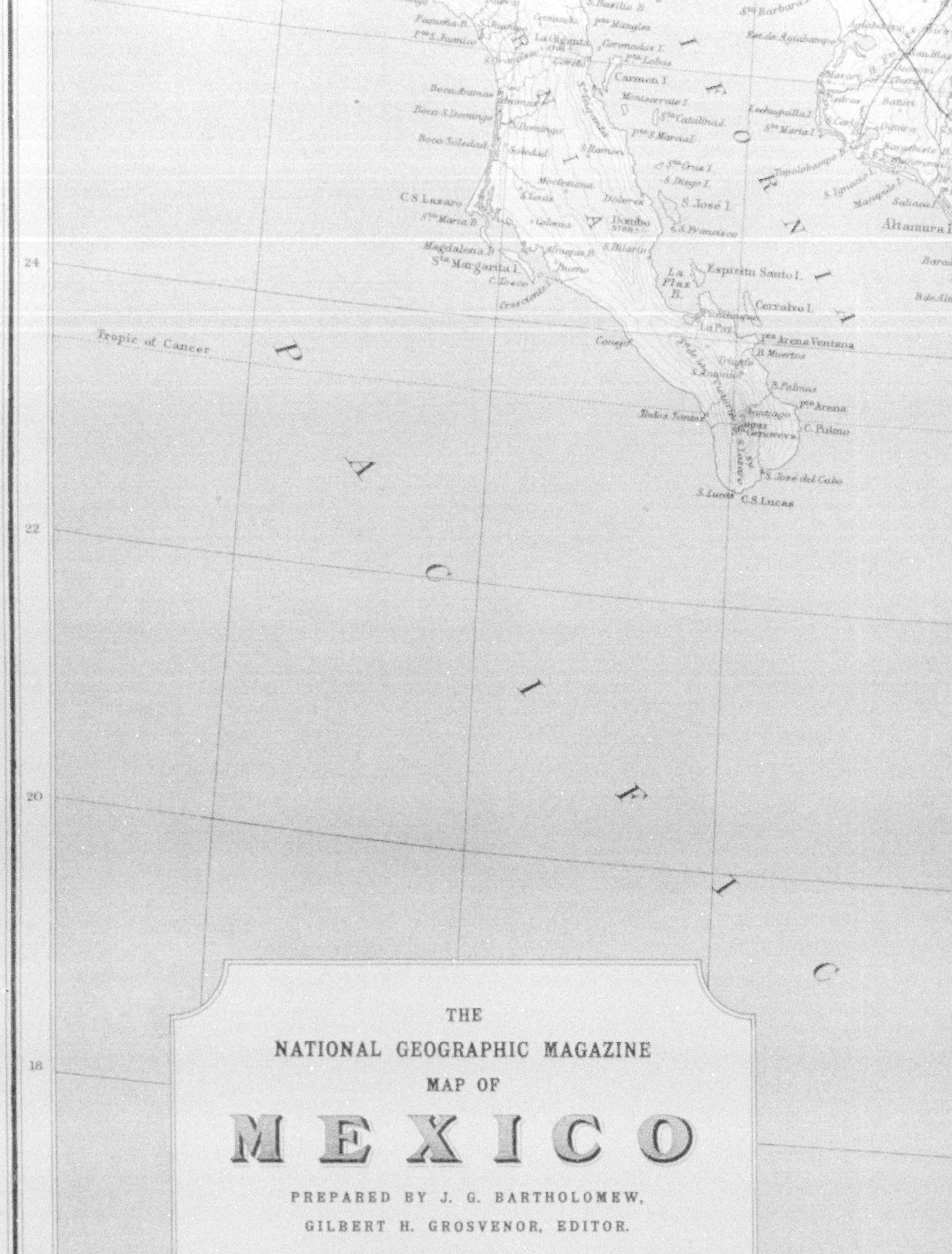
Meridian
Natchez
Baton Rouge
New Orleans
Lake Pontchartrain
Mobile
Pensacola
Chandeleur I.
Mississippi Delta
Pass a la Loutre
South Pass
S.West Pass
Grand I.
GULF OF MEXICO
Tropic of Cancer
Alacran Reef



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La Giganta
Coronados I.
Pta Lobos
Est. de Agiabampo
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Moctezuma
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Pta Arena Ventana
B. Muertos
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THE

NATIONAL GEOGRAPHIC MAGAZINE

MAP OF

MEXICO

PREPARED BY J. G. BARTHOLOMEW,

GILBERT H. GROSVENOR, EDITOR.

Scale 1: 5,000,000

English Miles

0 20 40 60 80 100 150 200

Railways Open In Progress

The Edinburgh Geographical Institute

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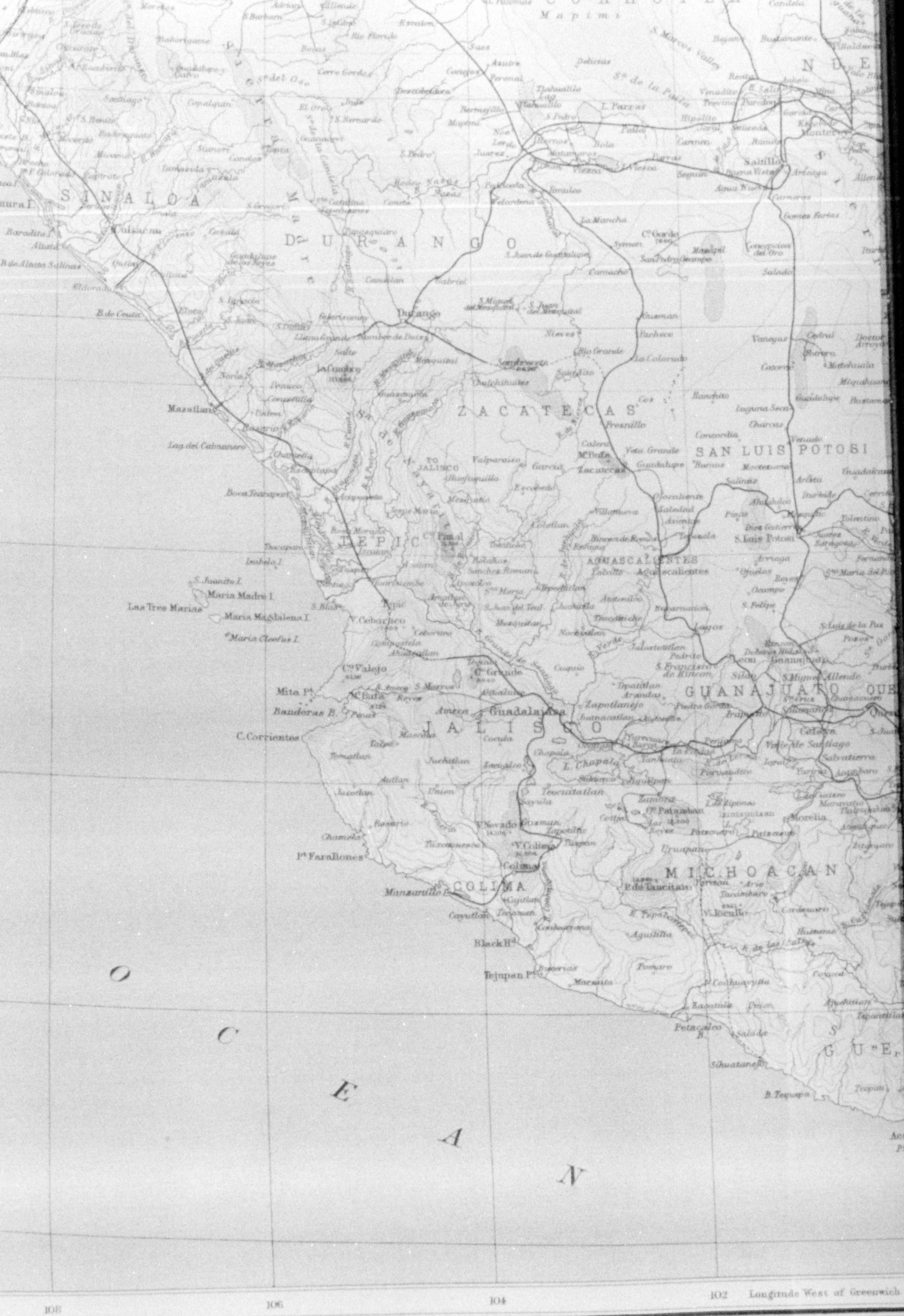
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GUANAJUATO
JALISCO
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MICHOACAN
TEPIC
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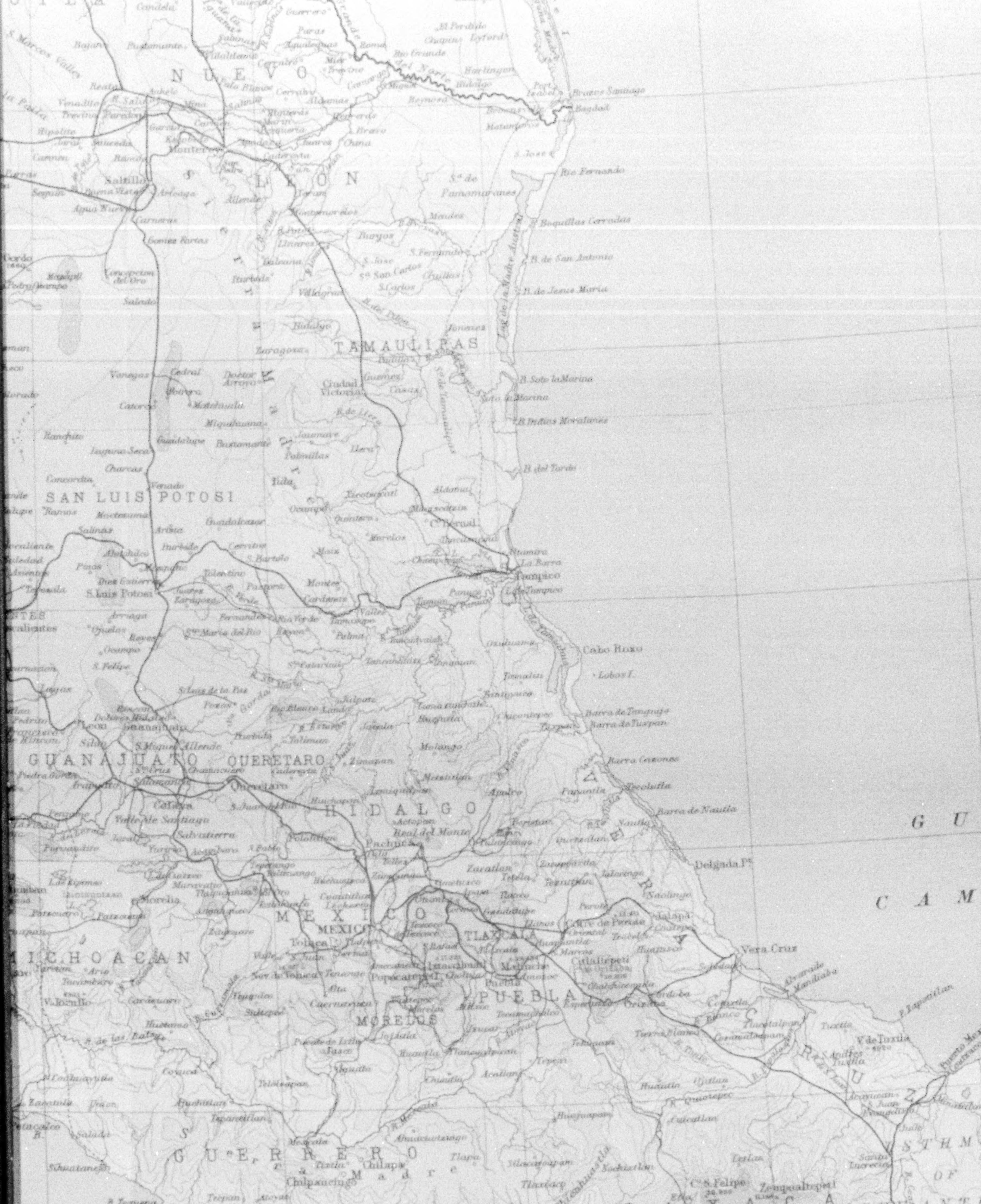
N U E V O   L E O N
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S. Luis Potosi
Tampico
Cabo Roxo
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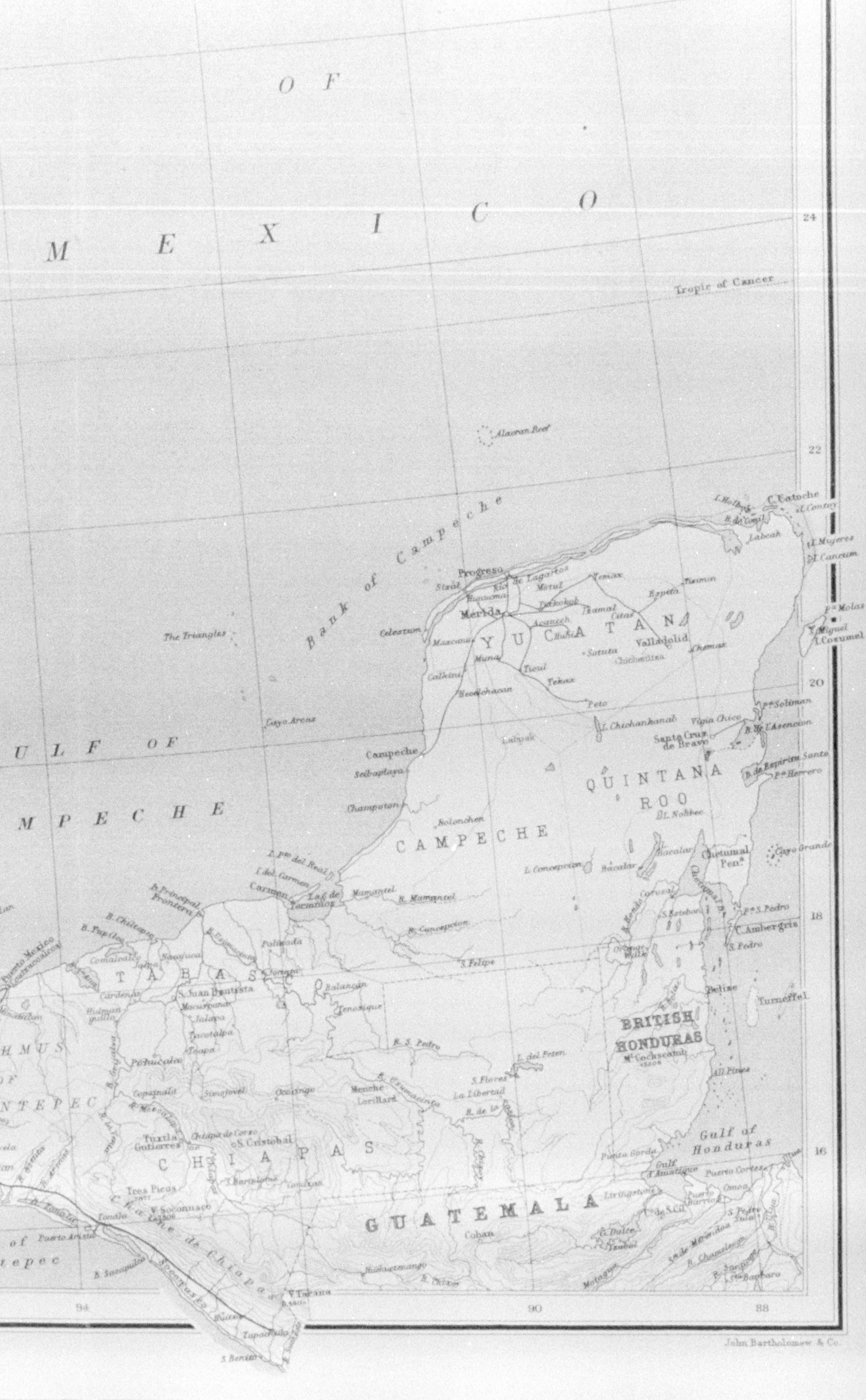
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WHY YOU MUST HURRY

This first sale of the Britannica, which is just ending, is at very low prices, in order to popularize the book as rapidly as possible.

You will realize very quickly how low these prices are, when we tell you that **$1,500,000** was paid for contributions and for the eight years of editorial work, before a single sheet of paper was printed. And **$2,500,000** was spent in manufacturing the first batch of sets. So that there was actually **$4,000,000 locked up in the Britannica before the publishers began to get any of their money back.**

Such a large sum of money cannot be left outstanding indefinitely. And the price is now being raised so that **people who buy the book after May 28th will make a larger contribution toward the preliminary expenses** by paying $29 more than you need pay now.

In one way, too, this "hurry-up" is just as much for your good as for the publishers'. You must have heard enough about the new Britannica to know it is a book you ought to use, and to give your children a chance to use. And very likely you have for some time had it in your mind that you would buy the book some day. But what a man can do any time, he is pretty likely to put off doing all his life. **The plain fact is that anybody who wants to buy the Encyclopaedia Britannica at the cheapest price, and on the easiest terms of payment, must act at once—signing and sending in *now* the order form (on the last page of this advertisement), with only $5. Otherwise he will let the chance slip by him.**

A FEW FACTS ABOUT THE WORK

29 VOLUMES.

44,000,000 WORDS OF TEXT.

41,000 ARTICLES.

30,024 PAGES.

14,689 ILLUSTRATIONS.

450 FULL-PAGE PLATES IN BLACK AND WHITE AND IN COLOR.

300 MAPS, SHOWING 125,000 PLACES.

500,000 SEPARATE REFERENCES IN THE INDEX.

There are 1,500 contributors, of 21 different countries, including the chancellors, presidents and principals of 54 universities and colleges, besides 650 other members of the faculties of these and 92 other such institutions; 101 members of the staffs of observatories, laboratories and surveys; 126 ambassadors, diplomatists, and officials of various governments; 327 historians; 107 agriculturalists and biologists; 62 business men and manufacturers; 75 physicians and surgeons; 72 engineers and architects; 75 lawyers; 161 theologians; 79 naval and military officers; 93 chemists, physicists, and mathematicians; 65 meteorologists, geologists and astronomers; 64 geographers and explorers; 72 economists and sociologists; as well as other specialists of other kinds, **representing, in all, 64 distinct professions and occupations.**

$29. TO $50. MORE

according to the bindings—that will be the difference after the end of the sale.

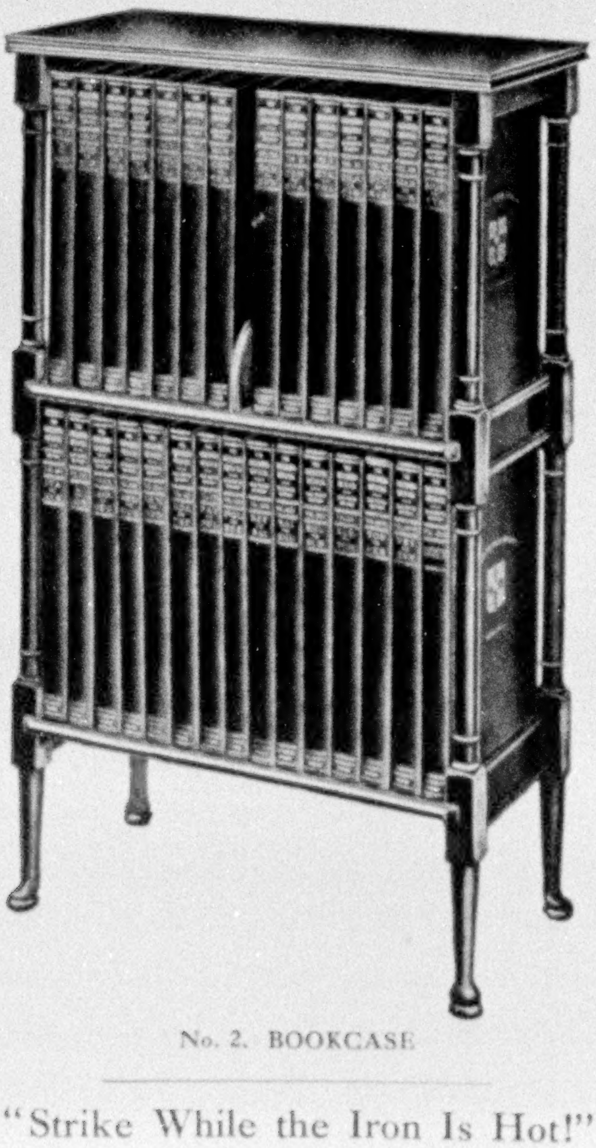
An Effort Worth Making

Even if you have to make some sacrifice to buy the Britannica, **as a good many subscribers tell us they are doing**, it is worth making sacrifices for. The small first payment—all we ask for now—is **nothing** in comparison with what the Britannica can do for you and **for your whole family**, within a few weeks after you have put it into your home.

For the Young People

Nothing does children more good than the use of a set of the Britannica. Even before they are old enough to read the volumes themselves, they will be instructed, as well as entertained, whenever you show them some of the 14,689 pictures in the book, and tell them what it says about the marvels of art and nature.

Sending your order today is making sure that **your children will have their fair chance.**



No. 2. BOOKCASE

"Strike While the Iron Is Hot!"

is sound advice. If you let May 28th slip by before ordering the Britannica, you will lose $29 or more. **And it would be a much more serious loss than that if you never ordered it at all, which might easily happen if you don't do it now.** Next month you certainly would not enjoy paying the increased price, for you will remember that you could have got the book cheaper before May 28th. Perhaps you could perfectly well afford to pay $29 more in June; **but a man hates to admit to himself that he has let a good chance slip,** and that he is injuring himself for being behind-time.

The Bookcases

We supply, to subscribers who want them, special bookcases, in three styles, for the Britannica.

No. 1 has the advantage of **holding the volumes at a slope,** which is a great comfort to any studious person using the Britannica for hours every day.

No. 2 takes the volumes in two tiers, and is very convenient in a small room, as it is only 19 inches wide.

No. 3, costing only $3, is a thoroughly sound case, holds the volumes at a slope, and will suit anyone who would like to stand his set, in this case, **on a table or desk top.** But of course it is not so handsome as No. 2.

The prices of these bookcases are shown in the order blank on the other side of this page.

The special bookcase for the Full Suede set is included in the price of that binding.

Dates for Deliveries

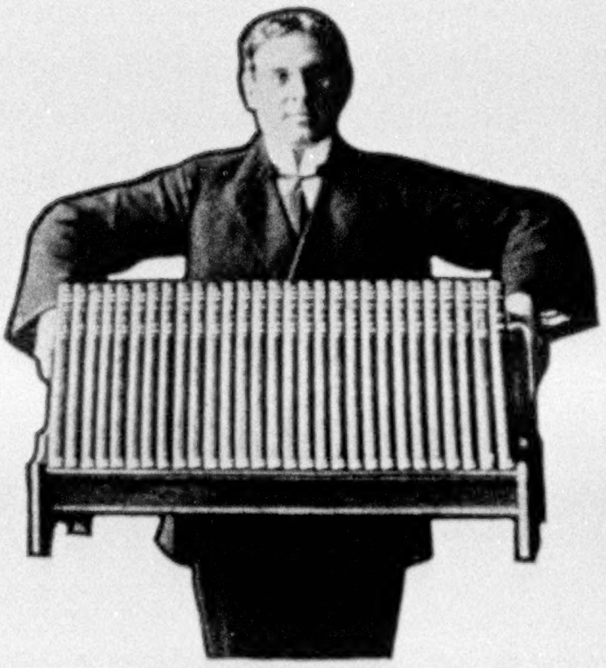
If you order **within 48 hours** after this magazine reaches you, you ought to be in time to get one of the sets that are now printed and bound **and** packed **all ready for immediate delivery.** Of course we cannot absolutely guarantee that you will not have to wait a little while, even if you order in the beginning of May; for this notice had to be prepared at the end of March, and when it was written we couldn't tell how large a demand there might be during April.

One thing, however, is quite sure. If you wait until the very last moment, and order only a few days before May 28th, you will have to wait until the end of July, or even until August, for your set.

First Payment Now and Delivery at Your Convenience

If you are going to be away from home this summer, or for any other reason you would rather not have your set delivered until September or October, you can pay $5 now, and have the volumes held for you until Fall.

We suggest this because we know that at the beginning of summer many readers will be taking a vacation, and if it will suit you just as well to have your set delivered later, it will **suit us a great deal better; for we shall have all we can do** to ship sets fast enough to those people who are in a hurry to use them.



No. 3. THE PORTABLE STAND

THE END OF THE SALE

is so near that you have no time to waste, and if you live anywhere near one of our offices, perhaps you can go in and see the various styles of binding at any of the addresses on the bottom of the first page.

During the last week our offices will all be open until 8 p. m. on Monday, Tuesday and Wednesday, May 25th, 26th and 27th, and until 12 o'clock, midnight, on the evening of Thursday, May 28th.

If by any chance you should not see this magazine until the last moment, you can secure a set on Thursday evening by **telegraphing or telephoning** to any of these offices.

The India Paper and the Bindings

The India paper used in the new Britannica makes the book three times as light, and one-third as bulky as the cheaper paper used in ordinary books.

THE ENCYCLOPAEDIA BRITANNICA CO.,
120 West 32d Street, New York.

ORDER FORM
for India Paper

Please send me the new Encyclopaedia Britannica, 11th edition, 29 volumes, published by The Cambridge University Press, of England. I enclose $__________ being (first payment / payment in full) and I agree to send the second and all subsequent payments on the corresponding day of each following month until payment is complete, in accordance with the style of binding and the terms of payment indicated by the X I have placed in one of the squares below, showing my selection. It is agreed that I shall keep the books, but the title does not pass to me until the total amount has been paid. Terms, F. O. B. N. Y. Please indicate binding desired by marking X in one of the squares.

☐ **CLOTH** (ordinary covers).

31 monthly payments of	$5.00		After May 28th this price will be $29.00 more.
20 " "	7.50		
14 " "	10.00	and 1 of $5.00	
12 " "	11.87		
8 " "	17.59		
4 " "	34.81		
Cash Price	137.75		

☐ **FULL SHEEPSKIN** (flexible).

37 monthly payments of	$5.00		This price will be $36.50 more after May 28th.
24 " "	7.50		
17 " "	10.00	and 1 of $5.00	
12 " "	14.29		
8 " "	21.22		
4 " "	42.06		
Cash Price	166.75		

☐ **FULL LIMP SUEDE**
(Prayer-Book Style).

46 monthly payments of	$5.00		This binding will cost $45.00 more after May 28th.
30 " "	7.50		
22 " "	10.00		
12 " "	17.89		
8 " "	26.65		
4 " "	52.94		
Cash Price	210.25		

☐ **FULL MOROCCO** (flexible).

47 monthly payments of	$5.00		After May 28th this binding will cost $50.00 more.
30 " "	7.50	and 1 of $5.00	
22 " "	10.00	" 1 " 5.00	
12 " "	18.52		
8 " "	27.56		
4 " "	54.75		
Cash Price	217.50		

____________________ *1914.*

Name ____________________

Address ____________________

Occupation ____________________

If in business add business address. ____________________

If you want a bookcase, please mark X in one of the squares below.

☐ (1) Single tier, solid mahogany : $14.50 cash (or 3 monthly payments of $5.00 after payments for the book are completed).
☐ (2) Two tier, solid mahogany : $8.75 cash (or 2 monthly payments of $5.00 each).
☐ (3) Portable oak stand ; $3.00 cash.

N.G.M.—J

India paper has never before been used in making volumes of such size. The public quickly discovered that it made the new Britannica a **delightful book to read while one sits in an armchair,** instead of having to lean over the table on which a heavy volume would have to rest. Our introduction of this delightful paper is universally recognized as a **great revolution in the publishing business.**

Another revolutionary improvement we have made is that the Full Sheepskin, the Full Limp Suede, and the Full Morocco bindings all have flexible backs, so that the volume opens out as flat as a sheet of note paper, and **lies open** without having to be clutched. In addition to this, the sides of the Suede volumes (which are as soft and as friendly to the hands as a high-grade glove) are so yielding that the volumes can be rolled up in the hand, or slipped into a grip or a coat pocket to supply the best of reading on a journey.

The **FULL MOROCCO** binding is necessarily expensive, and we recommend it only to people who are buying for presentation to others.

The **SUEDE,** with its exquisite surface, its corners rounded in prayer-book style, and its tasteful mole-color, is so unusual and fascinating, **that it is really quite as attractive as the higher-priced Full Morocco.**

The **FULL SHEEPSKIN** binding is a rich dark green color, burnished, and will wear as long and as well as the Morocco. Only the people who have seen the Suede or the Full Morocco can believe it to be possible that any book could be handsomer than this.

The **CLOTH** binding is of thoroughly sound workmanship.

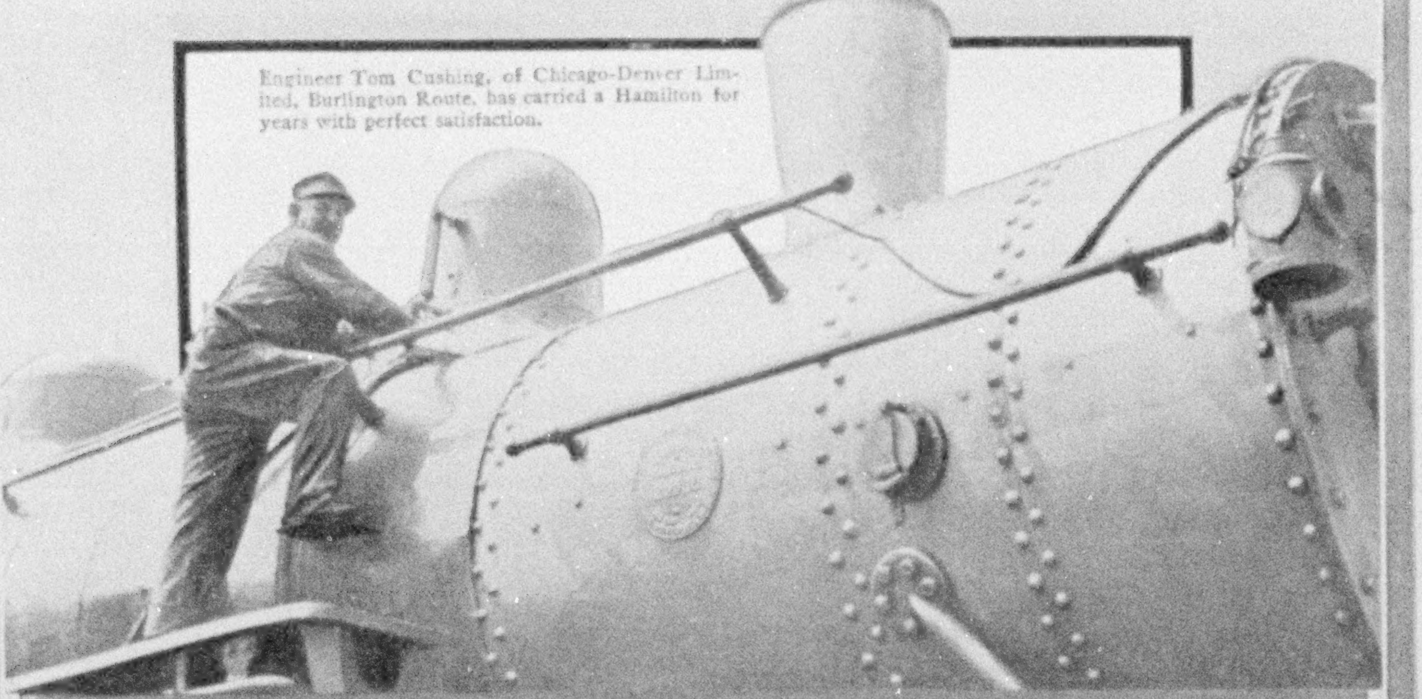
If any one of our staff were asked by a personal friend which binding he had better buy, the answer would probably be: *"If you haven't got to consider a "little more expense, buy the Suede. "If you feel just now like economizing, "buy the Sheepskin. If you think that "the Cloth is the best you can afford, buy "it, and put the other bindings out of "your mind—and you will be delighted "with it."*

If you buy a Cloth set now, we will at any time exchange it for one of the leather bindings, asking you to pay only the **present** difference between the two, **notwithstanding that the difference will have become very much larger.**

As 97 per cent of our subscribers have chosen the India paper, we have not wasted space by lengthening this order form to cover the case of the exceptional people who want sets printed on the thick paper. But anyone can write to one of our offices for a special order form—sending $5 to reserve a set. The thick paper set in Cloth now costs $130.50 (only 25 cents a volume less than the Cloth bound India paper sets) or 29 monthly payments of $5; but will cost $20 more after May 28th.

Hamilton Watch

"The Railroad Timekeeper of America"



Engineer Tom Cushing, of Chicago-Denver Limited, Burlington Route, has carried a Hamilton for years with perfect satisfaction.

The Watch of Proved Accuracy

Accuracy is the fundamental motive that makes anyone buy a watch. Few men, indeed, buy a watch for any other reasons than those that trace back to accuracy.

The Hamilton is a watch of proved accuracy. Wherever men work within fractions of minutes, you will find the Hamilton. As an example of this, note that:

Over one-half (56%) of the Railroad Men on American Railroads where Official Time Inspection is maintained, carry the Hamilton Watch.

Your jeweler, if you ask him, will add to these facts about Hamilton accuracy other facts from his own experience with the Hamilton. If you are interested in buying a fine watch

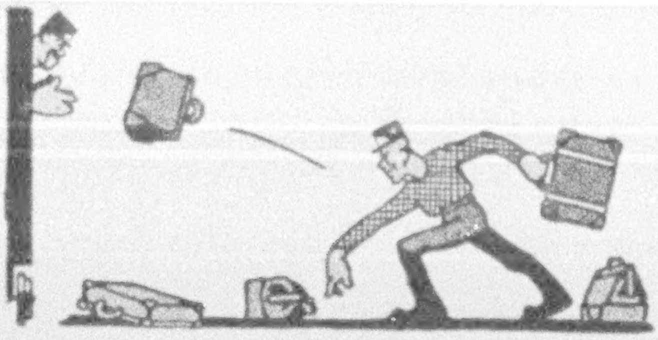
Write for the Hamilton Watch Book—"The Timekeeper"

It pictures and describes the various Hamilton models and gives interesting watch information.

There are twenty-five models of the Hamilton Watch. Every one has Hamilton quality and Hamilton accuracy. They range in price from $12.25 for movement only, up to the superb Hamilton masterpiece at $150.00.

Your jeweler can show you the Hamilton you want, either in a cased watch or in a movement only, to be fitted to any style case you select, or to your own watch case if you prefer.

Hamilton Watch Company
Lancaster, Pennsylvania



Bump! Thud! Bim-m-m!

What's that?

Oh, nothing much. Just a love tap or two from the baggage-handler as he heaves your luggage on board.

How can you stay calm in the face of such mauling? A near-by "Likly" dealer will show you "Likly" Luggage covered by the "Likly" Five-Year Guarantee. Backed also by 70 years' experience in producing high-grade baggage.

Really new designs in luggage are few and far between.

The "Likly" Wardrobe Trunk was one. The "Likly" Overnight Bag was another.

Now it's the "Likly" Country Club Bag shown above. The fastest-selling Oxford that has come across the horizon in many a long day. There are many reasons.

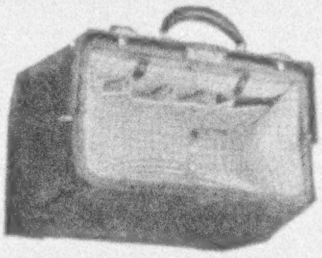
"LIKLY"

5 Yr GUARANTEED

LUGGAGE

Asks no favors of the baggage man

One is the leather. It is an imported pigskin, embossed with a walrus grain—an exclusive "Likly" finish. Another is the unusual method of protecting the bottom corners. The handle is riveted on to defy the strong-arm squad.



OPEN

Let's step inside. The lining is of durable plaid serge.

On one side are 8 slightly elastic, water-proof pockets for toilet articles.

On the other side are three long folio pockets for papers.

Prices: 18-inch, $15. 20-inch, $16.50. Comes also in Carabao Leather—an exclusive "Likly" importation. Prices: 18-inch, $25. 20-inch, $27.50.

TRADE ESTABLISHED 1844 HENRY LIKLY & CO MAKERS ROCHESTER, N.Y. MARK

We make 130 other styles of Oxford Bags, 95 different Suit Cases, 28 Kit Bags, 100 other designs in Hand Luggage.

And over 75 different Wardrobe Trunks. Over 80 other trunks. Over—oh, what's the use? It takes our 128-page catalog to describe the full line. Send right now for your copy.

Henry Likly & Co.

ROCHESTER, N. Y.

These Tires *Alone*

—are guaranteed not to skid on wet or greasy pavements, else returnable at full purchase price after reasonable trial.

—are guaranteed for 4,500 miles *actual* service for the user's protection only on the basis of years of proof that this figure is a *low minimum.*

—are guaranteed to be absolutely oilproof—immune to the effects of oil on roads, garage floors, or otherwise encountered.

PENNSYLVANIA *Oilproof* VACUUM CUP TIRES

No user has ever challenged the non-skid guarantee. Purchasers should always figure on the great excess mileage (above the guarantee) averaged by these tires, many records exceeding 12,000 miles on heavy cars.

The Oilproof feature is invaluable, and eliminates much worry and inconvenience.

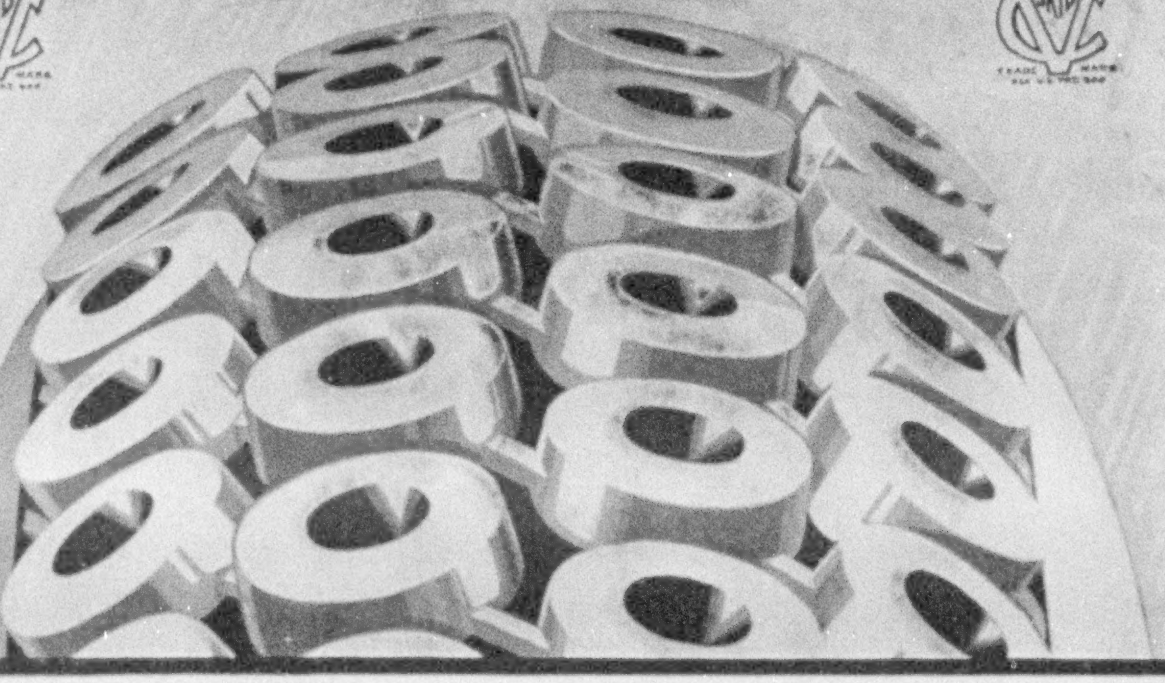
Start 1914 on VACUUM CUPS

Dealers Everywhere

Pennsylvania Rubber Company, Jeannette, Pa.

New York Chicago Cleveland Boston Pittsburgh San Francisco Los Angeles Detroit St. Paul Minneapolis Omaha Kansas City, Mo. Seattle Dallas Atlanta

An Independent Company with an independent selling policy



New England
The Vacation Land

Maine Lakes and Woods

If you want to be made over inside and out—come down into the Maine woods.

Camp on the banks of wonderful lakes that are almost forgotten by the outside world.

Take canoe trips of hundreds of miles thro' virgin wilderness.

Eat and sleep and fish and play in the REAL open.

Do you more good in two weeks than any ordinary two months. Cost is small.

Send for booklet.

The White Mountains of New Hampshire

Unrivalled combination of scenic grandeur, outdoor health, and brilliant summer life.

Mountains a mile high, hundred-mile views, 200 square miles of peaks, woods, valleys. Nerve-building, vitalizing air.

Finest of all golf links, up among the clouds. Every other outdoor sport. Magnificent hotels, famous for their cuisine. Charming boarding-houses with moderate rates.

Send for free booklet.

Vacation Books

Three books that give you the *practical* facts you want to know in choosing your vacation.

They include over 1000 New England vacation resorts in the White Mountains, among the Maine and New Hampshire Lakes and Woods, at Moosehead Lake, Cape Cod, Marthas Vineyard, Nantucket, Berkshire Hills, Mt. Desert and a summer coast that borders five states.

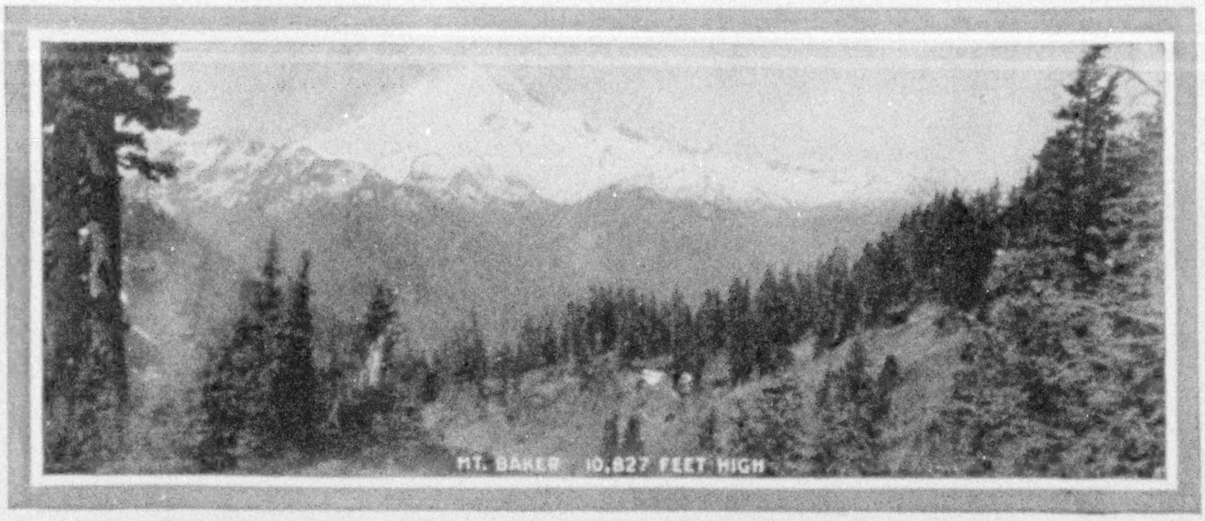
They contain lists of the best summer hotels, boarding houses, farms and camps, *with rates*, and much other practical information. You will find them very helpful.

Send for them, ***stating region you prefer.***

THE NEW ENGLAND LINES
BOSTON & MAINE RAILROAD
New York, New Haven and Hartford RAILROAD CO.
MAINE CENTRAL RAILROAD

For booklets and full information address

VACATION BUREAU
Pier 14, North River, New York



MT. BAKER 10,827 FEET HIGH

Mountain Giants

of the NORTH PACIFIC COAST

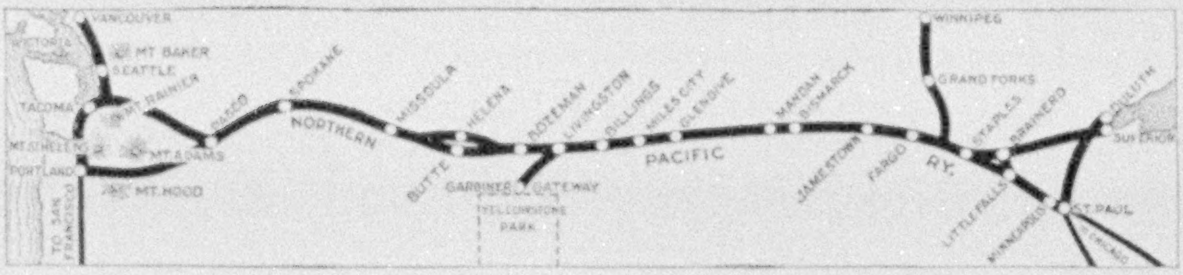
Five Grand and Inspiring Peaks Seen From

Northern Pacific Railway Trains

Two through trains daily Chicago to North Pacific Coast via St. Paul - Minneapolis.
Daily Pullmans and Weekly Personally Conducted Excursions Chicago to Yellowstone Park via Gardiner Gateway, June 15 to Sept. 15.

Send for literature about this country.

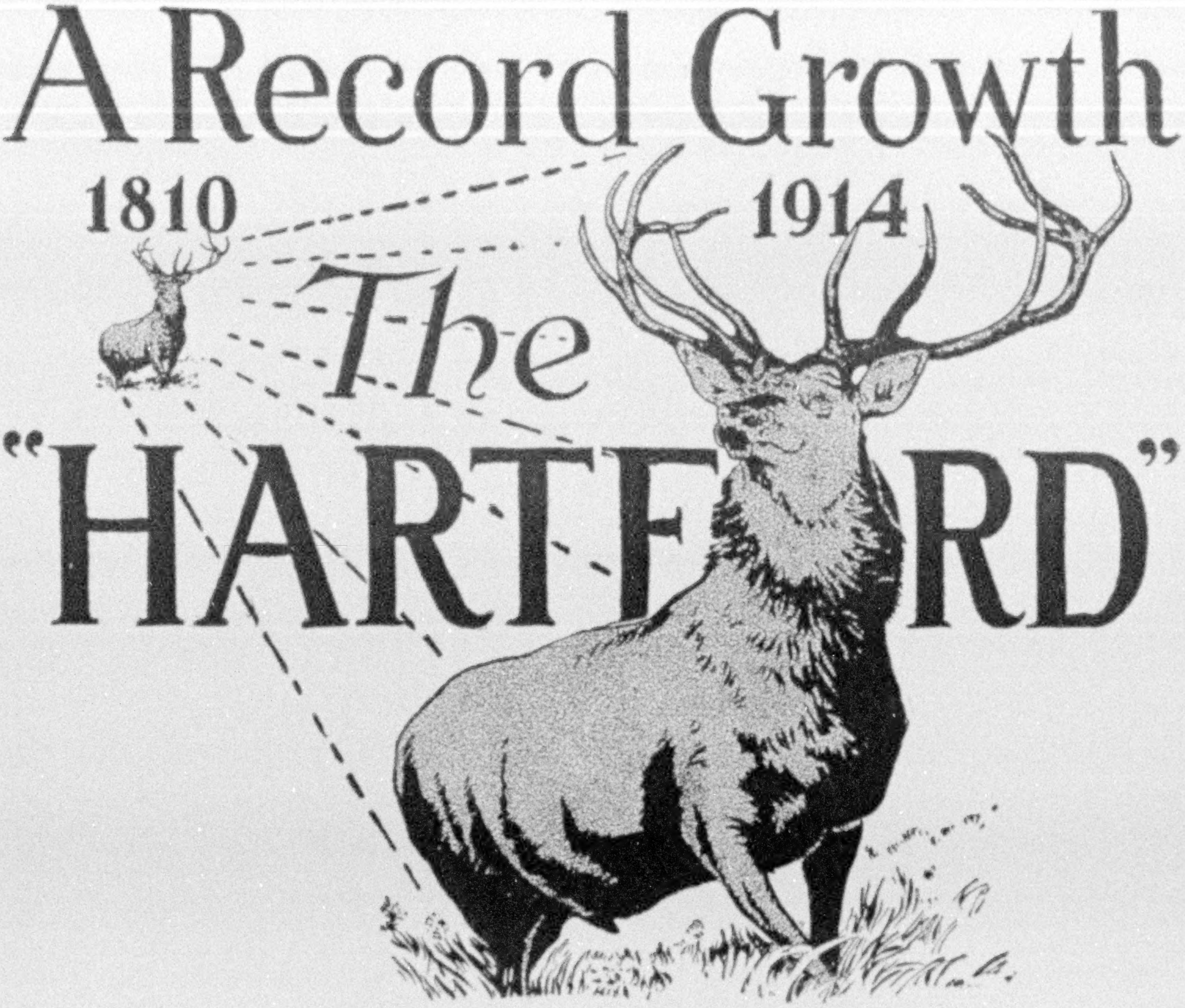
A. M. CLELAND, General Passenger Agent, ST. PAUL, MINN.


VANCOUVER
VICTORIA
MT BAKER
SEATTLE
TACOMA
MT RAINIER
MT ST HELENS
PORTLAND
MT ADAMS
MT HOOD
TO SAN FRANCISCO
PASCO
SPOKANE
NORTHERN
MISSOULA
BUTTE
HELENA
BOZEMAN
GARDINER GATEWAY
YELLOWSTONE PARK
LIVINGSTON
BILLINGS
MILES CITY
GLENDIVE
PACIFIC
MANDAN
BISMARCK
JAMESTOWN
FARGO
RY.
WINNIPEG
GRAND FORKS
STAPLES
BRAINERD
LITTLE FALLS
MINNEAPOLIS
ST. PAUL
CHICAGO
DULUTH
SUPERIOR

NORTHERN PACIFIC
YELLOWSTONE PARK LINE

MT. RAINIER 14,408 FEET HIGH

MT. HOOD 11,225 FEET HIGH

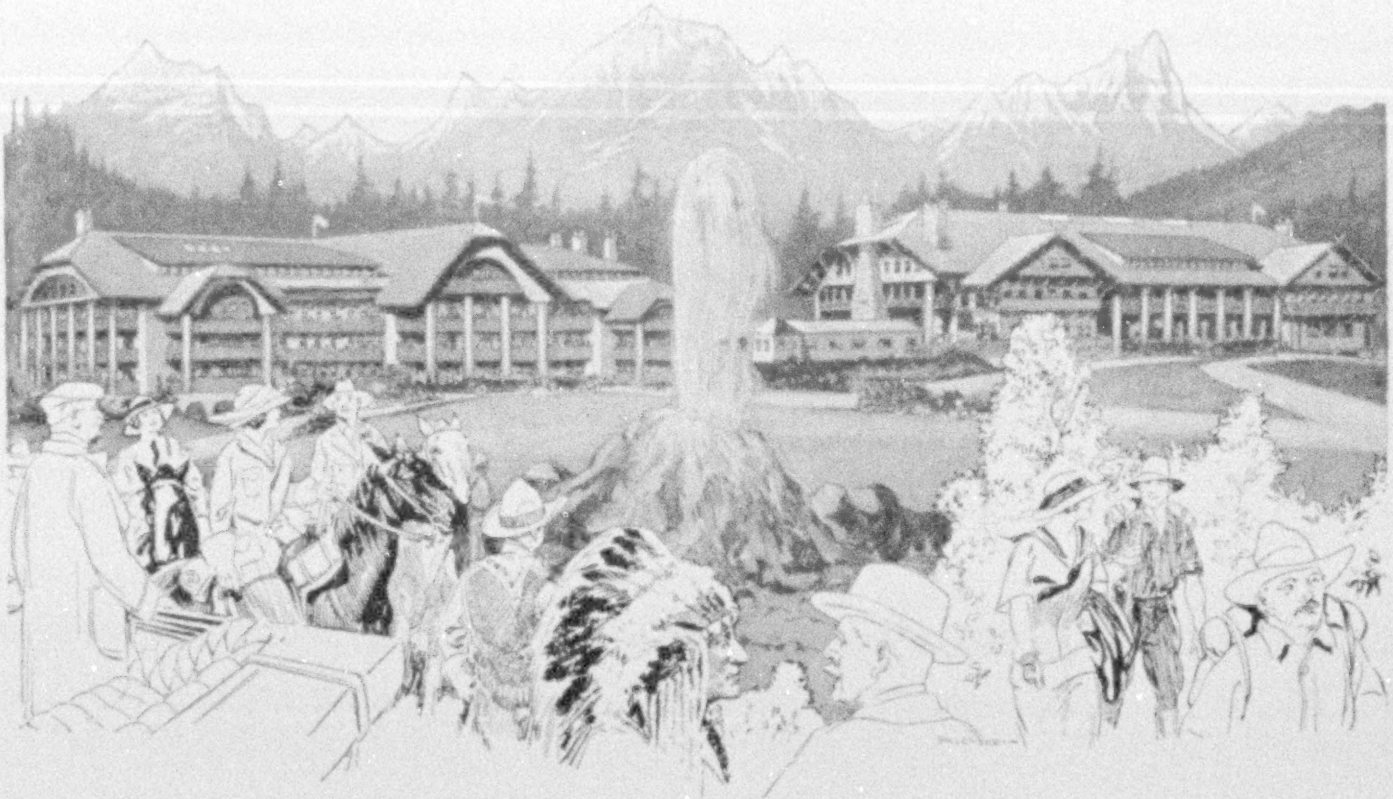


From small beginnings in 1810 the Hartford Fire Insurance Company has, in 1914, reached its present preeminent position in the fire insurance field. Its steady growth in strength has been unretarded by the enormous losses it has paid to its policyholders both in the great conflagrations of American History and in those small but persistent losses which occur somewhere every minute of every day and night.

Willingness to adjust losses fairly, ability to pay fully and readiness to pay promptly are the three great fire insurance virtues and they are the explanation of the **"Hartford's"** growth and prosperity.

When you need Fire Insurance

Insist on the "Hartford"



Increased Accommodations in

Glacier National Park

Season 1914, June 15 to October 1

The new and enlarged Glacier Park Hotel, official eastern gateway to Glacier National Park — land of glistening glaciers in the Rockies of northwestern Montana — offers you every desirable modern convenience on your vacation this summer.

An annex of 115 rooms has been erected and is connected with the main hotel by a 90-foot sun parlor. Every room is electrically lighted and heated. Over 60 guest rooms in the annex have private baths. Greater accommodations are to be found at the numerous chalets in the Park. Visit Glacier Park this summer. You can tour the Park on $1 to $5 a day — walking from camp to camp, living the delightful outdoor life, eating at the glow of the camp fires and sleeping under the stars. If you desire you can travel on horseback, by automobile, stage or launch.

Definite Expense Tours

For your convenience and pleasure the Great Northern Railway has arranged the following special tours this season:

One Day Tour—Cost $8.25—From Glacier Park Hotel to Going-to-the-Sun Camp via automobile and launch.

Three Day Scenic Tour—Daily July 1 to Sept. 1, $21.00—From Glacier Park Hotel through 100 miles of stupendous, ever-changing scenic grandeur.

Five Day Tour—$31.25—Penetrating into the northernmost sections of the Park—each step revealing new and overwhelming wonders of Nature, untouched by man.

Seven Day Tour—Daily July 1 to Sept. 1, $47—A panorama is spread out before you of untrod, sky-piercing mountains, glaciers centuries old, lakes that almost touch the heavens. You cross and recross the Continental Divide.

Aeroplane Map Free

Send the coupon for aeroplane folder and descriptive literature free. Our travel books are beautifully illustrated—advance pictures of the scenic feast that awaits you. Hotel rates and accommodations also furnished.

"See America First"
GREAT NORTHERN RAILWAY
Glacier National Park

Panama-Pacific International
Exposition, San Francisco, '15

C. W. PITTS,
Gen. Agt. Pass. Dept.,
210 South Clark Street, Chicago

S. LOUNSBERY,
Gen. Agt. Pass. Dept.,
1184 Broadway, New York

H. A. NOBLE, Gen. Pass. Agt.,
GREAT NORTHERN RY.,
St. Paul, Minnesota 181a

COUPON

H. A. NOBLE, Gen. Pass. Agent,
Great Northern Railway,
Dept. 4, St. Paul, Minn.

Please send me free descriptive literature and aeroplane folder on Glacier National Park.

Name ....

Address ....

City ....

100% Safety and 6% Interest

Don't compromise on safety. Make sure the investment you are considering is 100% solid and sound. The safety of your funds is all-important. After you satisfy the strictest requirements of safety—and not till then—consider the rate of interest. If you get 6% with safety, you are doing well. You have a good investment.

We offer a variety of thoroughly safeguarded first mortgage serial bonds, netting the investor 6%. They are in convenient denominations—$100, $500, $1,000 and $5,000.

These bonds have been thoroughly investigated by an organization with an experience of 32 years, during which time no investor has ever suffered loss of either principal or interest on any security purchased of this House. We have bought them with our own funds; we have surrounded them with thorough safeguards, and we recommend them to the investing public.

Call or write for Circular No. 502-F.

S.W. STRAUS & CO.
INCORPORATED
MORTGAGE AND BOND BANKERS
ESTABLISHED 1882

STRAUS BUILDING
CHICAGO

ONE WALL STREET
NEW YORK

A Gift She Won't Forget

Let your gift be the June bride's pride—the gift she will always cherish. Give HOMER LAUGHLIN CHINA. The graceful, dainty, shapes—the artistic, delicate, decoration—the inestimable length of service—make

HOMER LAUGHLIN CHINA

the most appropriate wedding gift imaginable, at such a reasonable cost. Go to any dealer today—see the almost endless variety of exquisite designs. Be sure to look for our trade mark—HOMER LAUGHLIN—on bottom of each piece. It is our guarantee to you. Send now for free copy of the "China Book," richly illustrated in colors—an interesting, instructive book that tells how China has been made for forty-two years in our Potteries—the largest in the world—a book that shows you how to successfully care for and select China.

HOMER LAUGHLIN CHINA CO.
NEWELL, W. VA.

A Supposition Concerning Bonds That is Frequently False

A popular idea concerning bonds is that the smaller the yield the greater the security; that to be conservative one must be satisfied with very small interest return.

No policy followed blindly could be more detrimental to the safe and profitable distribution of funds.

For the purpose of illustrating the difficult problem of interest return in relation to safety of principal, let us divide bonds into two classes:

1. Good Bonds which are well known to the investing public.
2. Equally good bonds which are practically unknown.

Well-known bonds are in popular demand. As the demand increases, the prices advance and the interest return is proportionately lessened.

Bonds not so well known may be equally well secured. Through lack of wide immediate demand, however, they are available on a more attractive interest basis.

The foundation of our investment service is thorough investigation to establish true and permanent worth before purchase.

Frequently we are able to offer to our clients bonds yielding from 5% to 6%, offering security quite equal to more popular (because better known) bonds yielding only 4% to 4½%.

Send for General Circular and Booklet AN-14—"Buying Bonds Systematically"

N. W. Halsey & Co.

NEW YORK
49 Wall St.

PHILADELPHIA
1421 Chestnut St.

CHICAGO
La Salle and Adams Sts.

BOSTON
Halsey & Co., Inc.

BALTIMORE
631 Munsey Building

SAN FRANCISCO
424 California St.

LONDON, Halsey & Co., Ltd.

GENEVA, Switzerland

Bonds Which Are Unsatisfactory

to their owners can in many cases be exchanged for more suitable investments on a basis which will react greatly to the advantage of the investor. The value of trading certain bonds and stocks at certain times is fully explained in a special pamphlet we have just prepared on this subject. The reasons why it is many times beneficial to make a trade are not appreciated or understood by the average investor. Therefore we invite requests from those unfamiliar with the subject for our Pamphlet No. JE-85.

A. B. Leach & Co.

Investment Securities

149 Broadway, New York
105 So. La Salle St., Chicago

Boston
Baltimore
Philadelphia
Buffalo
London, Eng.

A Seasoned Investment Netting 6%

First-mortgage bonds of $500 and $1,000 denominations.

Cash investment in security over four times bond issue.

Original loan reduced 25% by serial payments.

Sinking fund has always exceeded bond requirements.

Old established company.

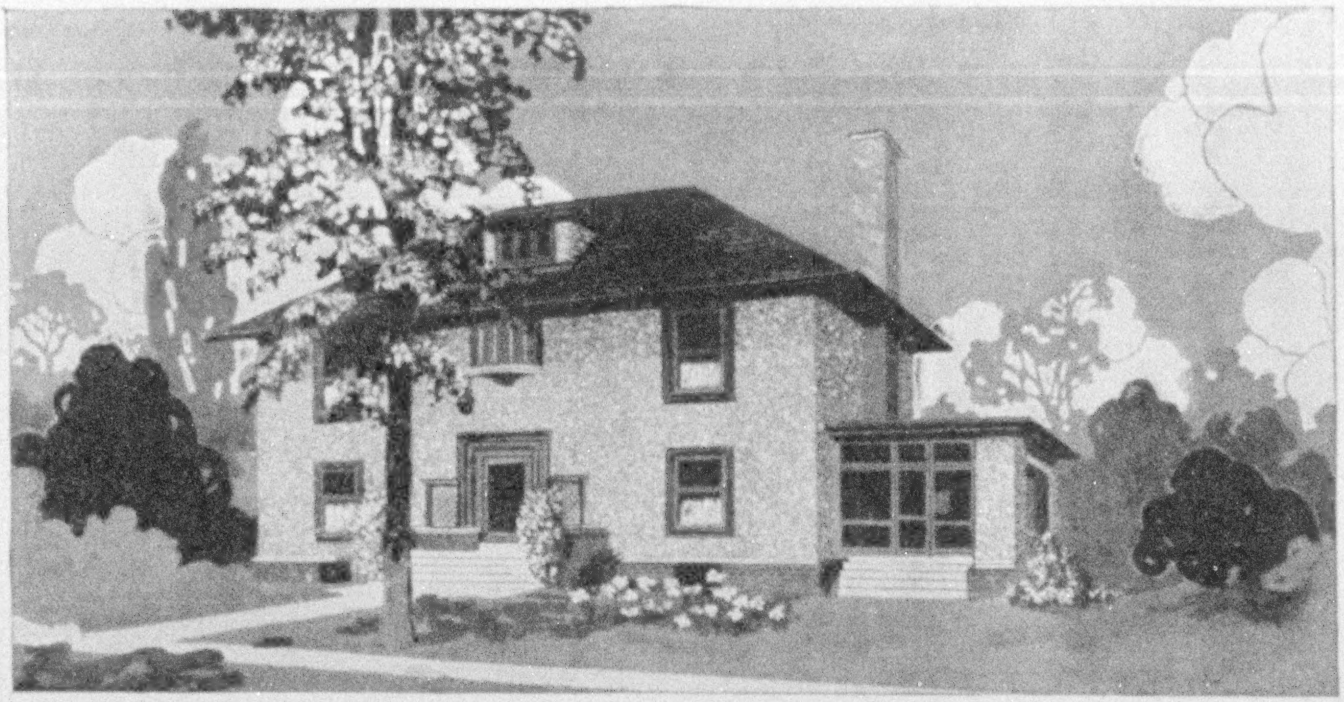
Capable management.

Ask for Circular No. 734-D

Peabody, Houghteling & Co.

(Established 1865)

10 S. La Salle St., Chicago



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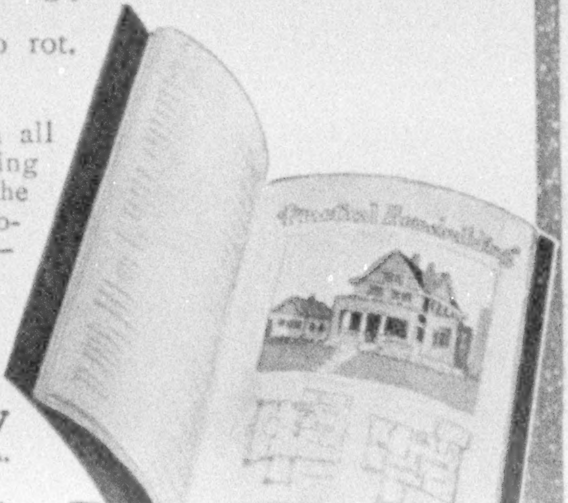

Send ten cents to cover cost of mailing and ask for booklet 849.

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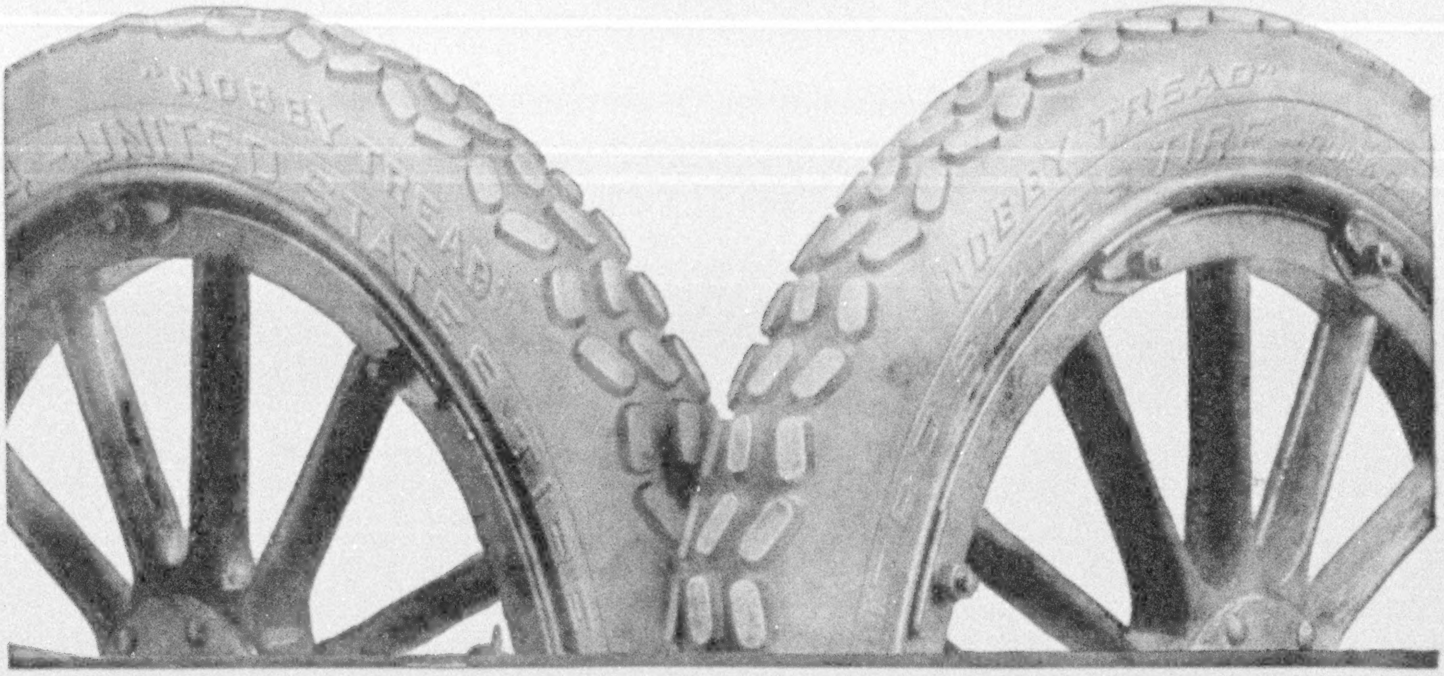

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Investigations prove that with "Nobby Tread" Tires punctures are 90% less than with the average tire.

The big, thick "nobs" on "Nobby Tread" Tires stand out so far from the shoe that nails, glass, sharp stones, etc., hardly ever reach the shoe.

Study the "nobs" their size, their thickness, and the way they are placed, and you will understand why.

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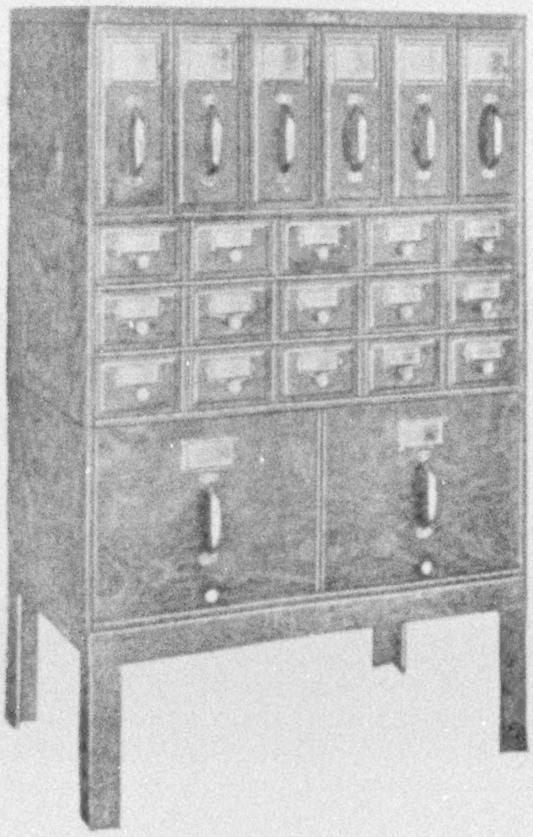
NOTE THIS:—Dealers who sell UNITED STATES TIRES sell the best of everything.



Globe-Wernicke

Office Equipment

IT is nearing the time when summer slackness gives an opportunity to clear the decks for Fall action, revise old systems, install new equipment, improve the general efficiency of your business. Start the Globe-Wernicke way—installing the equipment that the whole world knows as standard.

Of course, you will adopt the Unit System. The appreciation of the unit principle of construction is now well nigh universal. Any other method appears clumsy and old-fashioned by contrast.

Beauty combines with Utility to produce the perfect Globe-Wernicke result. Beauty of workmanship—a nice skill in cabinet-making—is developed with the Safeguard System to fit the varying schemes of business. The utility of the sectional idea is easily apparent—the equipment grows section by section as the business expands. Then it fits in anywhere—any vacant wall space fits some arrangement of the units.

But use the Coupon below—it will be a benefit to your business.

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COUPON—Send your pamphlet, "Filing and Finding Papers," No. 370, to name and address written on the margin below.

Vol. XXV, No. 5 WASHINGTON May, 1914

THE NATIONAL GEOGRAPHIC MAGAZINE

MEXICO AND MEXICANS

By William Joseph Showalter

Especial attention is called to the map of Mexico published as a supplement to this issue of the National Geographic Magazine. *It contains the latest and most accurate information of the geography of the country, and also gives the transportation routes open and in prospect, as well as the contours of altitude. The map is the highest example of the cartographer's art that has been produced with Mexico as its subject. Additional copies of the map may be obtained from the offices of the National Geographic Society. Price, 50 cents each; mounted on linen, $1.*

PERHAPS nowhere else in the world is there a country so full of contrast as Mexico. With a university established before John Harvard, Elihu Yale, or William and Mary were born, the masses of its people are hopelessly ignorant. With a hospital founded before Jamestown was even dreamed of, it is one of the most backward regions of the earth in a medical way. With natural riches greater than those of a thousand Midas's, its masses are just as poor as the proverbial church mouse. With a constitution as perfect as any organic law in the civilized world, it is a nation whose rulers always have been a law unto themselves.

Effigies of Judas Iscariot — to be burned, crunched, exploded, or hanged by the neck until dead—may be bought in the same stores that sell the latest creations of the dressmakers' and the milliners' arts from Paris. A bull ring, built of American steel and concrete, stands within earshot of the Republic's leading hotel, and the sound of the perfervid cheering of the sun-gods as they applaud their favorite matador when he executes a brilliant pass, and the band responds with the Diana, may be wafted into the very precincts of the American Embassy itself.

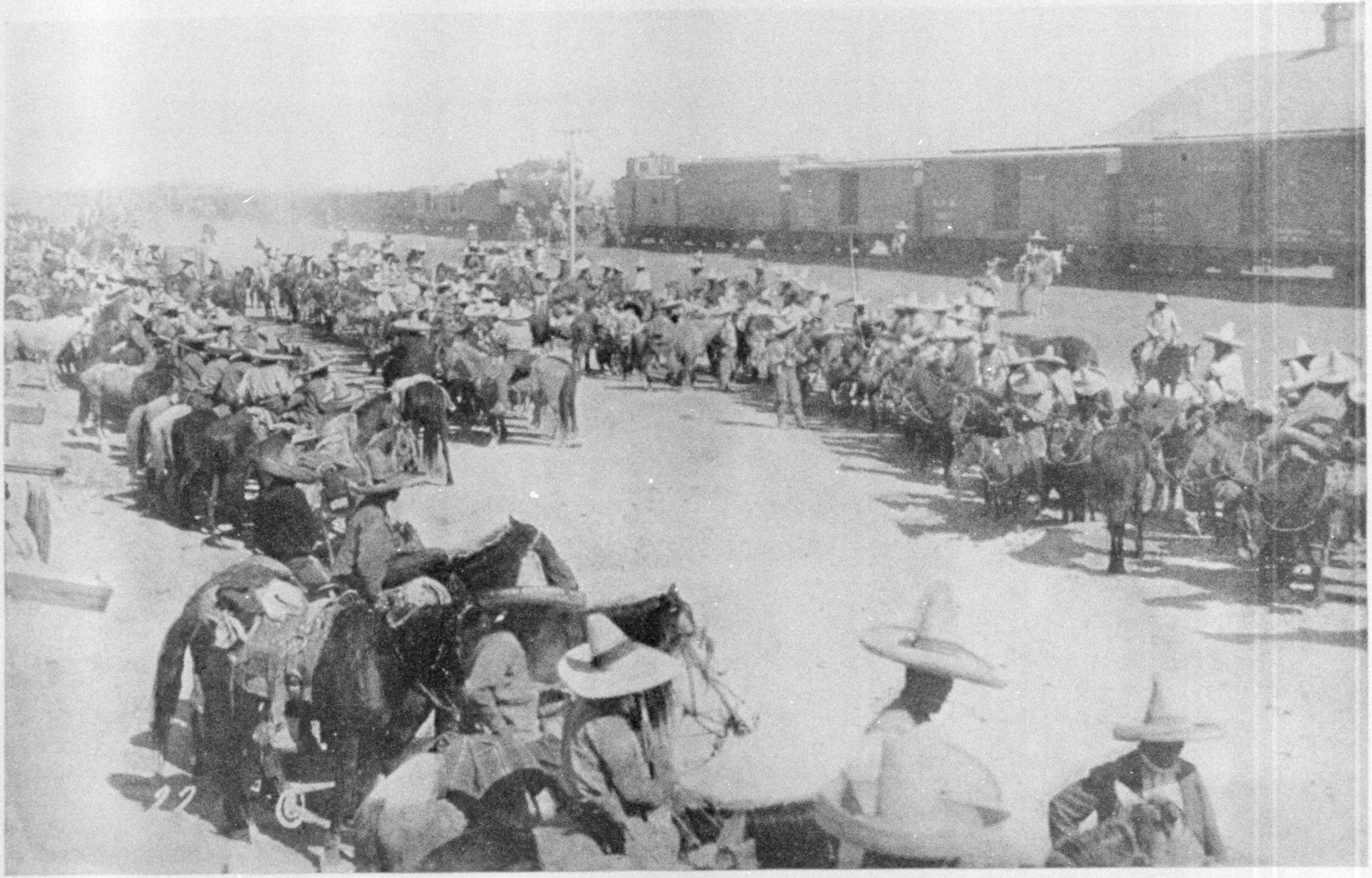
Here you will see a Mexican half-breed, barefooted, wearing a dollar pair of trousers, a fifty-cent shirt, and a ten-dollar sombrero. There, at a single glance and within the length of a single city block, you may see an Indian *cargador*, a donkey, an ox-cart, a carriage, a railroad train, a street-car, and an automobile—almost every type of locomotion since Adam.

WIDE CLIMATIC RANGE

You may tread the burning sands of a tropical desert with the wet of the perpetual snow of towering mountains still upon your shoes. You may take a single railway journey of 36 hours in which the people you see at the railroad station will be dressed in four different weights of clothing.

Land of the inordinately rich and of the abjectly poor; land of the aboriginal Indian and of the twentieth-century business man; land of perpetual snow and of

XUM



MEXICAN TROOPS AT BAUCHE, CHIHUAHUA, DURING THE OROZCO REVOLUTION

Photo by Altman and Dorman

"The most conspicuous thing about the male population of Mexico, so far as the masses of half-breeds are concerned, are their hats. These are bought even if their purchase does force the buyer to go hungry for months afterwards, for the peon is not nearly as much a slave to his haciendado as he is to his hat" (see text, page 491).

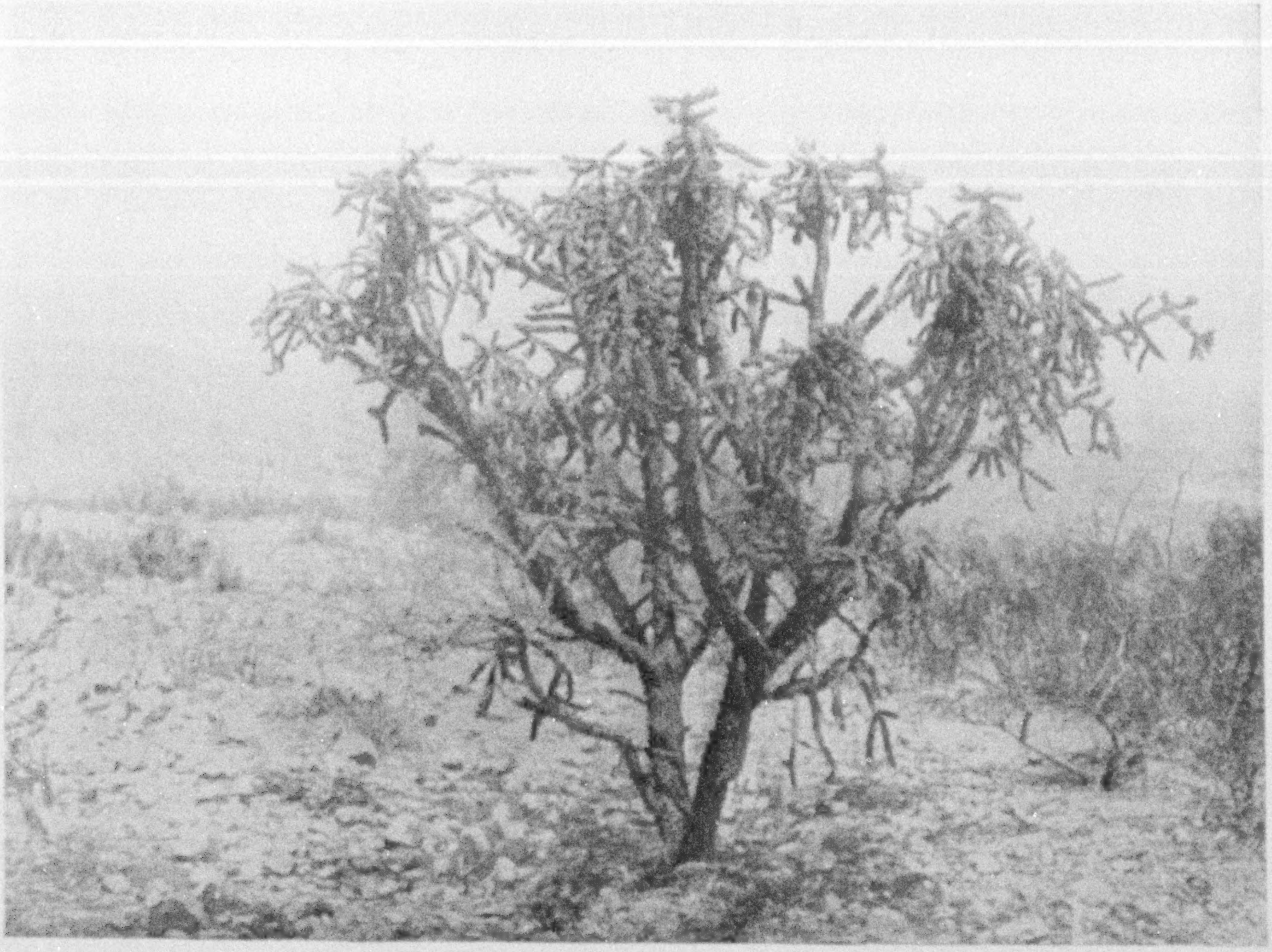


Photo by Shirley C. Hulse

A VARIETY OF CACTUS WHICH IS A SOURCE OF MUCH ANNOYANCE TO STOCK AND TO RIDERS IN CHIHUAHUA, MEXICO

Any part of the bush will come away freely, and a slight touch will serve to attach almost any amount of such cactus to the person. The process of removal is usually long and painful.

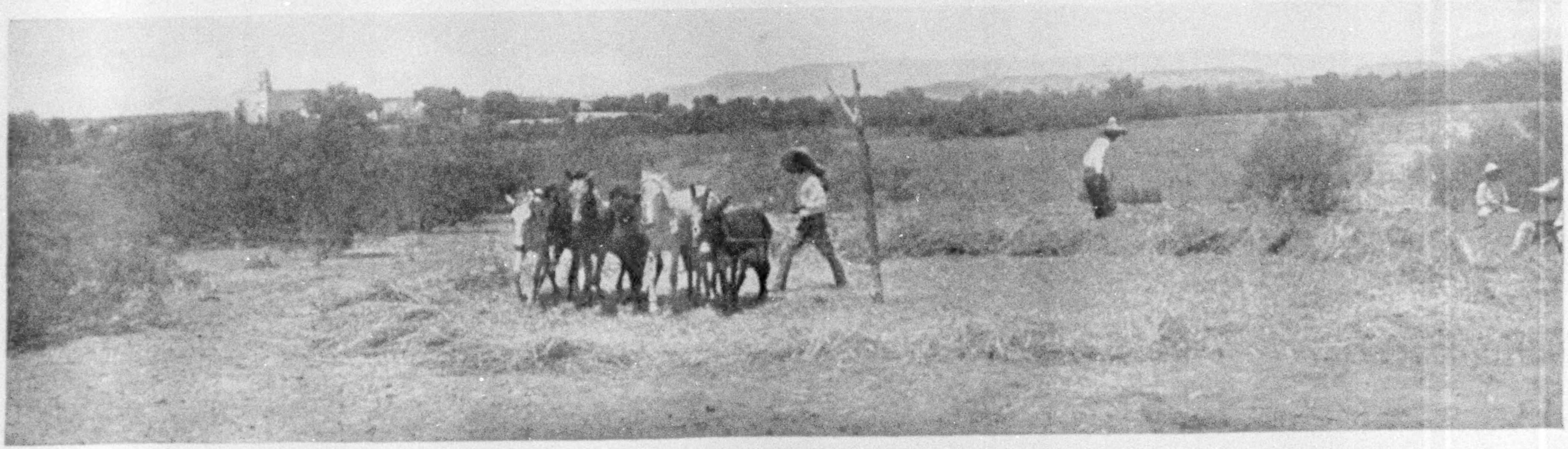
unending summer—everywhere you turn there is contrast, high lights and deep shadows. Fitting indeed is Ober's beautiful apostrophe to this wonderful region:

"Mexico lies at the meeting-place of two zones—the Temperate and the Torrid—and from its geographical position, combined with its altitudes, possesses a greater variety of soil, surface, and vegetation than any equal area of contiguous territory in the world. Basking in the sunshine of the tropics, her head pillowed in the lap of the North, her feet resting at the gateway of the continents, her snowy bosom rising to the clouds, she rests serene in the majesty of her might. She guards vast treasures of gold and silver; emeralds and opals adorn her brow; while the hem of her royal robes, dipped in the seas of two hemispheres, is embroidered in pearls and the riches of the sea.

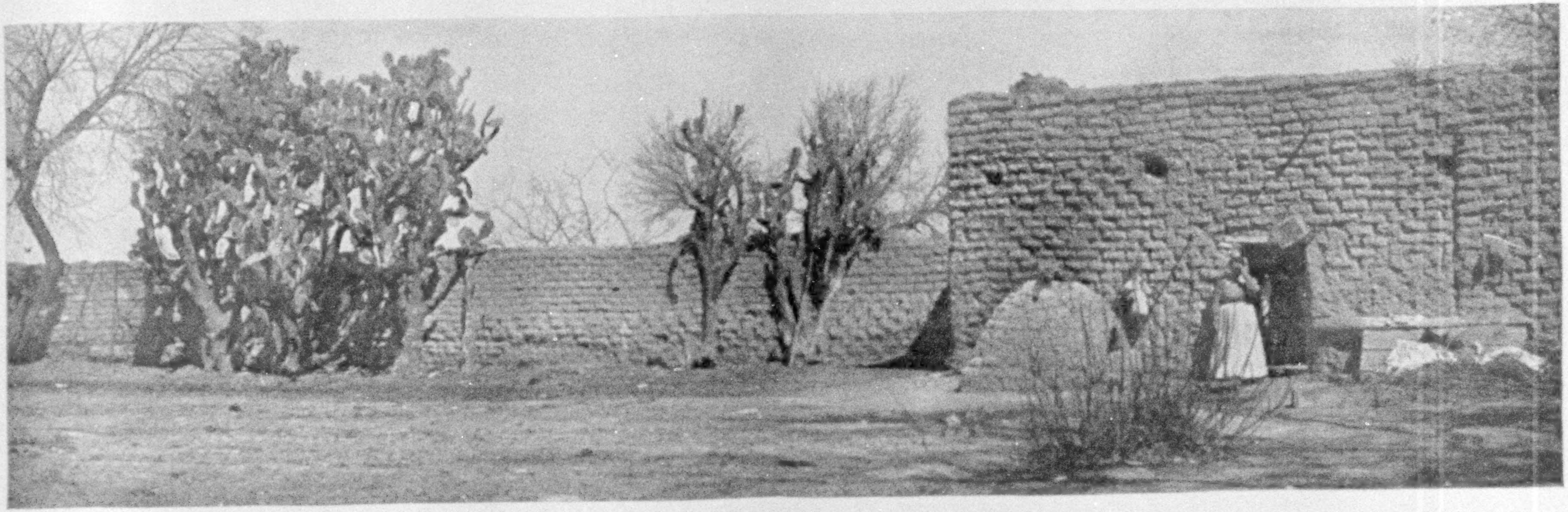
"Mother of western civilization! Cradle of the American race! A thousand years have been gathered into the sheaf of time since her first cities were built. When the Norsemen coasted our western shores she had villages and towns, white-walled temples, and spreading palaces. When the Pilgrims landed at Plymouth Rock, a hundred years already had passed since the soldiers of Cortés had battled with the hosts of Montezuma. In no country in the world can you pass so rapidly from the blazing shores of the heated tropics to the region of perpetual winter, from the land of the palm and the vine to the land of the lichen and the pine."

ONE-FOURTH AS LARGE AS THE UNITED STATES

Mexico has an area approximately one-fourth of that of the United States, a



THRASHING WHEAT IN A MEXICAN VILLAGE: THE VILLAGE CHURCH IS, AS USUAL, A VERY PROMINENT PART OF THE LANDSCAPE



Photos by Shirley C. Hulse

THIS PICTURE WAS TAKEN ON ACCOUNT OF THE VERY FINE "NOPAL" CACTUS, WHICH STANDS ON THE LEFT; ASIDE FROM THE CACTUS, THE VIEW IS TYPICAL OF THE BACKYARDS IN A SMALL MEXICAN VILLAGE fourth of whose area once belonged to Mexico. It has a coast-line some 6,000 miles long, although its greatest length is less than 2,000 miles and its greatest breadth only 750 miles. Although its area is only one-fourth that of Brazil, its population is approximately equal to that of the empire of the southern continent.

Some 15 million souls live within its borders, of whom more than two-thirds can neither read nor write.

Of the total population, only 19 per cent are white, 43 per cent are of mixed parentage, while 38 per cent still maintain their Indian blood uncorrupted. The foreign population two years ago numbered 100,000 souls, of whom 30,000 were Americans, 20,000 Spanish, and 5,000 British.

MEXICAN AGRICULTURAL POSSIBILITIES

The agricultural possibilities of Mexico, despite its vast central desert plain, are great. It has millions of acres of the finest grazing land, great bodies of land that will produce two crops of corn a year, large areas of banana lands that can match those of Guatemala and Costa Rica, coffee lands that produce coffee not only fit for the "queen's table," but used on it, rubber lands, and cocao lands—all lying accessible to good railroads and in touch with the world's markets.

Go to Yucatan, go to Colima, go to Chiapas, go to Vera Cruz, and everywhere outside the great desert you will find a soil teeming with possibilities. And portions even of the desert land, if we may judge by what we have done with our own western alkali plains, may yet be made to blossom when the irrigationist and the plant-breeder join hands.

The possibilities of the arid and semiarid regions of Mexico are disclosed at Saltillo, on the Mexican plateau between Mexico City and Laredo, Texas. The traveler who journeys from the capital to the frontier spends a night and a day traveling over a barren region, with here and there an adobe city, and with nothing but the green of the cacti to relieve the depressing brown of the desert. About twenty hours out of Mexico he comes to Saltillo.

In a moment he passes from the desert into a broad oasis that is wonderful for its vegetation and beautiful for the air of prosperity and well-being that dwells with it. Here land that yesterday was as bare as Mother Hubbard's cupboard today is laden with all the good things that the vegetable kingdom affords. A strange combination of tropical and northern agriculture greets the eye. Most of the things which grow in our own western country flourish alongside of the crops which grow south of the Tropic of Cancer.

A trip along the Pan-American railroad, with its magnificent forests and great ancient estates, among them one on which the cattle still wear the brand of Cortes; over the Isthmus of Tehuantepec, where the tropical jungle rivals that of the Motagua River Valley in Guatemala, pronounced by Frank G. Carpenter the richest in the world, and then on up through the great Atlantic plain of middle Mexico, suggests the immense undeveloped resources of the country.

In the middle and lower altitude belts of the country the banana and the orange flourish. The excellent railroad facilities of Mexico give a good outlet to the ports at Vera Cruz and Tampico, where ships are constantly loading for European and American ports. The orangeries of eastern Mexico are nearer to the eastern part of the United States than are those of southern California, and crop failures among them are unknown. With the same methods of cultivation that are pursued in Florida and southern California, they should be a source of vast wealth to the country.

THE HOME OF CORN AND COTTON

Although the value of the corn produced in Mexico each year is greater than that of any other product, not even excepting gold or silver, the country still has to import a part of its supply. The reason is not far to seek—it is the nationwide love for the tortilla. There are vast areas where it is easy to produce two crops of corn a year and where each crop grows with an exuberance that would delight the heart of any corn-club contestant in the United States.

It was my good fortune to travel through the region lying between the Mexican highlands and the lowlands,

Photo by Dr. C. William Beebe

This pastoral scene is where two springs—one hot, the other cold—arise close together, near the city of Colima and the active volcano of the same name, in western Mexico. This part of the country is noted for its enormous wild fig trees.

from Santa Lucrecia to Cordoba, and wherever I came across one of those little Mormon settlements which dot the prairie stretches of this region there were fields of corn to be seen the like of which may be met in but few parts of the United States.

Uncounted generations before the United States came into being the Indians of Mexico had their little patches of corn. It was the great staple of Montezuma's court, and to this day it is almost the sole support of the Mexican Indian.

There are few parts of Mexico, either in the hot belt adjoining the sea or on the table-lands between the mountains, where corn is not cultivated with success. How valuable the crop might be made when farmed in the Illinois and the Iowa way is shown by the wonderful success with which the Mormons have met when undisturbed by war.

History does not recall the time when cotton first was cultivated in Mexico. The Spaniards found it there. Indians clothed with cotton garments were first seen by Columbus along the coast of Yucatan at the very dawn of the sixteenth century. The Toltecs wrote in their sacred books that Quetzalcohuatl, god of the air, grew cotton of all colors in his garden and taught them its many uses. In the times of Cortes the Indians quilted armor of cotton, which was proof against arrows.

To this day cotton is cultivated with profit in many parts of the country. In the Laguna region it is perennial and does not require to be planted oftener than once in ten years. Some of the largest cotton factories in the world are to be found in Mexico. The great Rio Blanco mills, in Orizaba, rank with the best in England and America.

REMARKABLE MEXICAN PLANTS

Mexico probably has a greater range of remarkable vegetation than any other country in the world. The parrot fruit tree produces an odd-shaped fruit, bearing a close resemblance to green parrakeets. Evidently mindful of this striking resemblance, when the parrakeet is frightened it makes a dash for the parrot tree, where it assumes a position which makes it look like the fruit itself. So close is the resemblance that their enemies, the hawks, occasionally fly by a tree on which a dozen or more of these birds are sitting, apparently unaware of their presence.

Another remarkable tree is the "Arbol de Dinamite" — dynamite tree — whose fruit, if kept in a warm place, bursts with considerable force and a loud report, scattering its flat seeds to a surprising distance.

THE PAPAYA TREE

One of the most interesting fruits in Mexico is known as the melon zapote, or papaya. It grows wild and attains a height of as much as 25 feet. The dark-green leaves are from 20 to 30 inches long and grow at the top of an otherwise leafless trunk. The fruit would seem a cross between a cantaloupe, a pumpkin, and a watermelon. The tree begins to bear fruit when a year old, producing from 20 to 100 melons at a time, a single one of which may weigh as much as 20 pounds.

The melons contain considerable pepsin, which reacts against both acid and alkaline conditions of the stomach, and it is said that a diet which includes papaya precludes dyspepsia. Both the fruit and the leaves possess the singular property of rendering tough meat tender. When the pulp of the fruit is rubbed over a piece of tough meat the juice attacks the fiber and softens it.

The trees are well defined as to sex, and where they are cultivated but one male tree is permitted to grow in a grove of fifty or more females.

Mexico abounds in orchids, and some of the most beautiful species known in the plant kingdom are there to be found.

As one journeys through the country from the Tehuantepec Railroad to the Vera Cruz and Mexico City line he sees dozens of species of orchids on the forest trees, some of which would bring top prices in the New York market.

MEXICAN RAILROADS

No other country in the New World, south of the Rio Grande, is so well supplied with railroads as Mexico. Prior to the Madero revolution it had 20,000 miles of up-to-date American railroad. At six different points lines crossed the frontier from the United States, and Laredo, Eagle Pass, and El Paso gateways handled much traffic to and from Mexico. The Mexican railroads carried 11,000,000 passengers annually at that time, and handled about 11 million tons of freight. Their total revenues amounted to about $40,000,000.

The government owns a controlling interest in the major portion of the mileage of the railroads, and is the owner of the Tehuantepec road and of the Vera Cruz and Isthmus line. A plan was on foot a few years ago to extend a branch of the Tehuantepec road to Yucatan, to connect up with the United Railways of that province. This would give every section of the country railroad communication with every other section.

Besides the Tehuantepec route there are two or three other transcontinental lines. The Pan-American Railway extends from the Tehuantepec route to the Guatemalan frontier, and this gives through railroad connection from Canada to Guatemala city. But having traveled over this route, let me advise the sea trip as one far more comfortable, even to those who are not good sailors.

From an American standpoint the Tehuantepec route is by far the most interesting of the Mexican railroads, because it is the principal prospective competitor of the Panama Canal. This road is built on the line of the proposed Eads' ship railway, from Coatzacoalcos to Salina Cruz. It is approximately 200 miles long, and crosses the continental divide above Rincon Antonio.

EADS' DREAM

How Eads could see a ship railway across those mountains is more than I can imagine. When you journey across a mountain on a railroad that is well located, and yet on which the curves have to be so sharp that the rear platform of your car and the headlight of your locomotive point in the same direction, and when this happens not once, but a dozen times, and in a 20-car mixed train, you cannot imagine, in your wildest

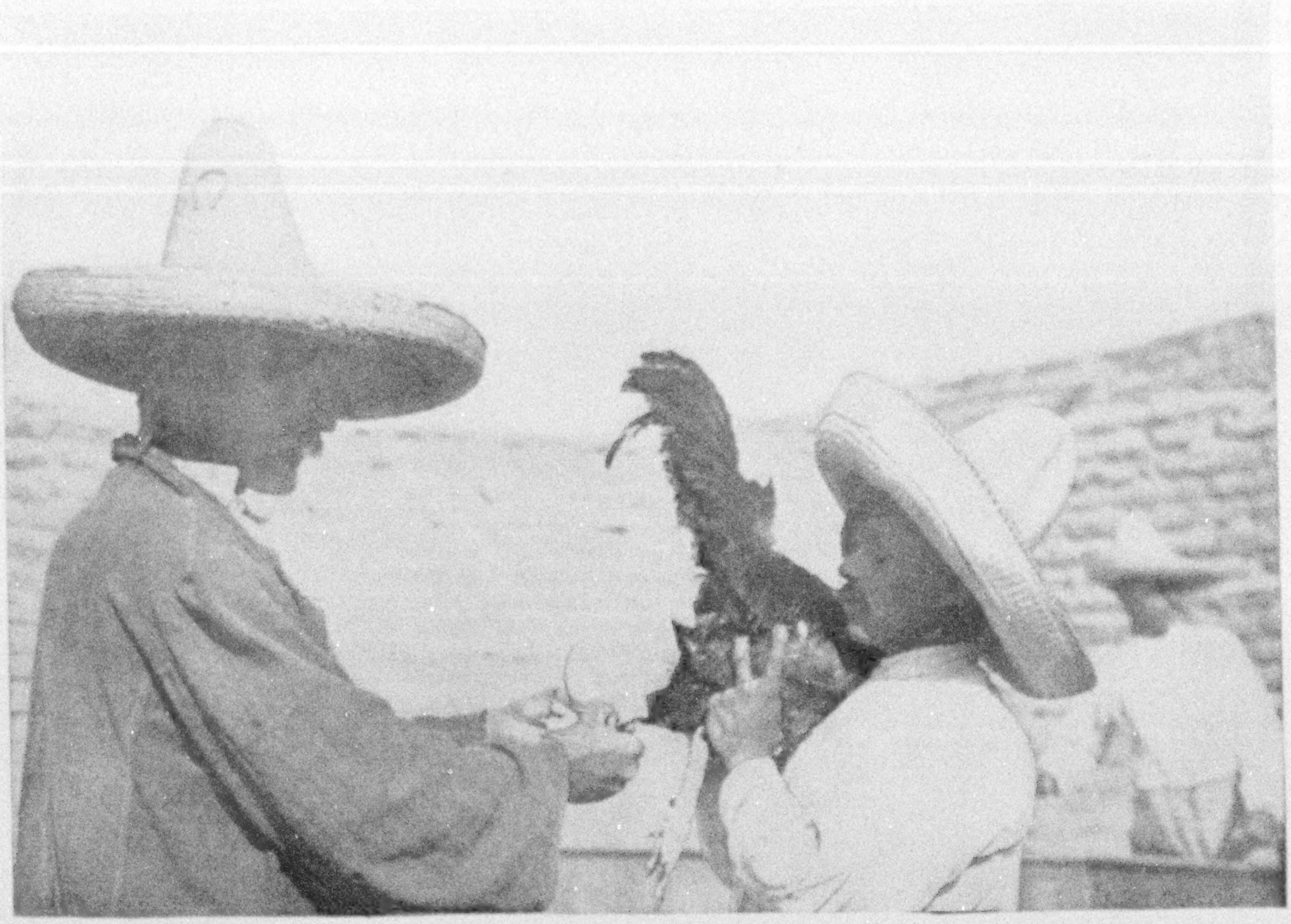


Photo by Shirley C. Hulse

"HEELING" A COCK

The Mexicans use a gaff, or heel, up to three inches or more in length. As contrasted to the needle-like heel which is used elsewhere, the Mexican heel is broad and razor-sharp on both edges, except that the top edge is blunted for a little ways back of the point to insure the penetration of the gaff, which might otherwise merely rip instead of cutting deep. The Mexicans sometimes wrangle and haggle for hours while arranging terms of the fights, which are usually over very quickly after they are once started. Not infrequently both cocks fall dead after the first clash.

flights of fancy, how a ship could be hauled over those mountains in a gigantic cradle.

There are many peculiarities about the Tehuantepec Railroad. It is owned by the government, but is operated by a company made up of two equal partners, the Mexican government and the firm of S. Pearson & Son. Each partner contributed half the capital of the firm, and they share the profits, the Pearson firm being the managing director.

The Mexican government owns about one-third of the stock of the American-Hawaiian steamship line, which is the principal freight producer for the Tehuantepec Railroad. Years ago these ships went around South America, from Hawaii to New York, with their cargoes of sugar. When the Mexican government decided to build the Tehuantepec Railroad, it proposed to the steamship line to take a third of its stock, and to handle its cargoes across the Isthmus upon terms that would be more advantageous than the trip around South America. It agreed to handle the business between Salina Cruz and Coatzacoalcos for one-third of the through rate, with the understanding that if this did not afford a profit to the steamship company the railroad would be willing to accept as low as a fourth of the through rate.

COMPETING WITH PANAMA

With the opening of the Panama Canal, the American-Hawaiian line will send its ships through that waterway, in spite of the fact that the Mexican government owns one-third of the line's stock, and took it in order to get the steamships to use the Tehuantepec route.

But although the Tehuantepec officials

Photo by Shirley C. Hulse

MEXICANS WATCHING A COCK FIGHT

concede that on through cargo business they cannot, under any circumstances, compete with the Panama Canal, they still believe that they will not be seriously affected by the opening of the big waterway. They think that the business boom that the canal will bring to tropical America will give enough additional mixed cargo to take the place of the through cargo lost.

To illustrate: On a ship loaded with lumber and bound for New York from Oregon, the Tehuantepec route could not quote a rate that could compete with the canal; but on a ship that left Liverpool with mixed cargo, some bound for California, some for Hawaii, some for Peru, and some for China, the Tehuantepec route could transfer that cargo as advantageously as the Panana Canal.

Mexico spent a fortune in building port works at Salina Cruz and Coatzoalcos for the loading and unloading of the big ships that carry cargo to and from the Isthmus. At the former place a modern harbor has been made where scarcely an indentation in the shore line existed before. The inner harbor is artificial entirely, and ships now ride 30 feet above what once was the old town site of Salina Cruz. Great blocks of concrete make a sea-wall between the inner and the outer harbors. The outer harbor is formed by two great breakwaters which leave an opening about 600 feet wide out to sea. These breakwaters enclose a harbor space of about 20 acres.

Ships are loaded and unloaded with electric cranes, the cars having trap doors in their roofs. The peons often handle as much as 60 tons of sugar each a day. They are paid a standard wage, with a bonus for all above a certain amount they handle, and they certainly do work for that bonus. When the railroad was begun, wages in the Tehuantepec region were 25 cents Mexican a day; they soon reached $1, then $1.50, then $2.00, and finally, $2.25 a day.

An interesting sidelight on the policy of former President Diaz toward the upbuilding of a middle class in Mexico was afforded me by a conversation with the Vice-President and General Manager of the National Railways. He told me that General Diaz wanted to put Mexicans in

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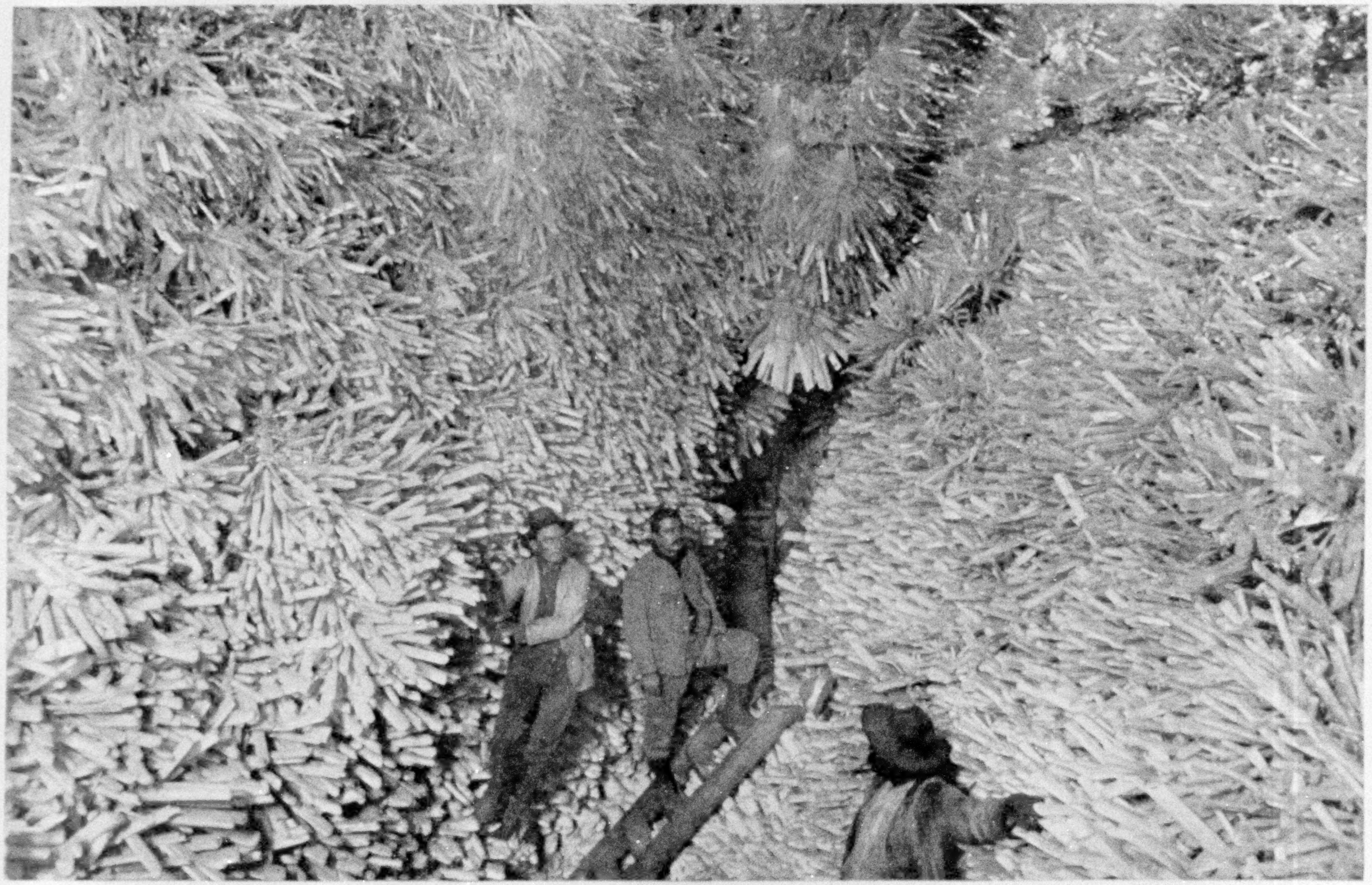


FLASHLIGHT PICTURE TAKEN IN THE COALCITE CRYSTAL CAVES AT NAICA, A MINING TOWN NEAR SANTA ROSALIA, CHIHUAHUA

These caves have not been fully explored. Many of the crystals retain water of crystallization, and are sometimes used as hand-levels by the native miners.

every place that they could fill, because it would be good for the country, in the development of a middle, thinking class, to have the employees as well as the ownership of the railroads nationalized. He felt that to have Mexican conductors, engineers, telegraphers, etc., would be to assist in the establishment of a middle class, which he recognized as Mexico's crying need.

The railway manager knew by experience that the Mexican does not make as good a railroad man as the American, but he was gradually carrying out this policy at the time I was in Mexico, which was just before the fall of Diaz. It was Diaz's idea that the establishment of industries in Mexico and the employment of Mexicans in responsible positions in connection with them must eventuate in a middle class worthy of the name.

SOME MEXICAN INDUSTRIES

Mexico has many important industries, and some of the plants are the largest of their kind in the world; for instance, the Bueno Tono Cigarette Factory, of Mexico City, has a daily output of 12 million cigarettes a day. It is the largest factory of the kind in the world, and earns a 12-per-cent dividend on an investment of $3,250,000.

The Mexican Light & Power Company, with a capitalization of $25,000,000, operates the great hydro-electric plant at Necaxa, which is one of the largest on the Western Hemisphere.

A few years ago there were in Mexico 145 cotton mills, with 732,000 live spindles, and employing 35,000 operators. The owners of a single chain of mills at Orizaba employed 5,000 people and turned out products valued at many millions of dollars (see also page 476).

One of the largest glycerine and soap factories in the world, with a daily output of 75,000 boxes of soap, was in operation in the very country where the Federals and the Constitutionalists have been fighting during the past few months.

All of these growing industries were demanding something in the way of intelligence from their employees and were making progress in the direction of establishing a middle class in Mexico.

THE MINES OF MEXICO

Humboldt once pronounced Mexico "the treasure-house of the world." It produces one-third of the world's silver, a considerable percentage of its gold, one-ninth of its lead, and one-twentieth of its copper. The country's mineral production, exclusive of iron, coal, and petroleum, amounted to $158,000,000 in 1910. With the exception of Campeche, Tabasco, and Yucatan, every State in the Mexican republic possesses mines, of which there are 21,000, covering 633,000 acres of mineral lands, and giving employment to half a million men. Yet probably less than one-fourth of the mineral possibilities of the republic have been exploited. Prior to the outbreak of the Madero revolution, upward of 5,000 mining claims were registered each year.

The famous iron mountain at Durango is estimated to contain 600 million tons of iron ore, which is worth seven times the value of all the gold and silver mined in Mexico in two centuries. It is believed that this deposit was formed by the same process that made the Hudson River palisades, near New York city. A big opening was made in the earth's crust, through which this enormous mass of iron was thrust up, and piled high above the surrounding territory. No one knows how deep this iron mass penetrates. It is nearly a mile long, more than a third of a mile wide at the base, and some 700 feet high. An American smelter company has erected works to utilize this iron.

The Santa Maria graphite mines are the largest and most important in the Western World. There are seven beds of graphite deposits, varying in thickness from 9 to 10 feet. They were formed from coal beds by the metamorphic action of intrusive granite. The graphite is transported to Saginaw, Mich., where it is ground up and sold to the pencil and lubricant factories of the world.

The region around the Gulf of Mexico is very rich in petroleum. Some years ago an oil company was engaged in sinking a well near Tampico. At a depth of 1,824 feet a gas explosion blew out the entire installation of machinery, and the well

Photo by Shirley C. Hulse

A TYPICAL REVOLUTIONIST IN MEXICO

This picture was taken at the request of the photographed, and the request was in no uncertain terms

took fire. It burned unchecked for three months, during which time 10 million barrels of oil were consumed (page 490). Hot salt water gradually replaced the oil.

The Mexican Eagle Oil Company, at Potero del Llano, struck a gusher which flowed 100,000 barrels of oil a day. A huge storage reservoir, with a capacity of 3,000,000 barrels, was established to take care of the oil pending its going to market.

It is believed that the oil fields of Yucatan, Vera Cruz, and Tampico, when once peace is established, will go a long way toward meeting the unprecedented demand for gasoline that the automobile has created.

HOME INDUSTRIES

The delicate drawn-work of the Mexican Indian is justly famed throughout the world and deserves to rank with the finest of Spanish and Italian laces. Thousands of Indian women work at a wage of 10 cents a day, from early morning to nightfall, around the drawn-work frames

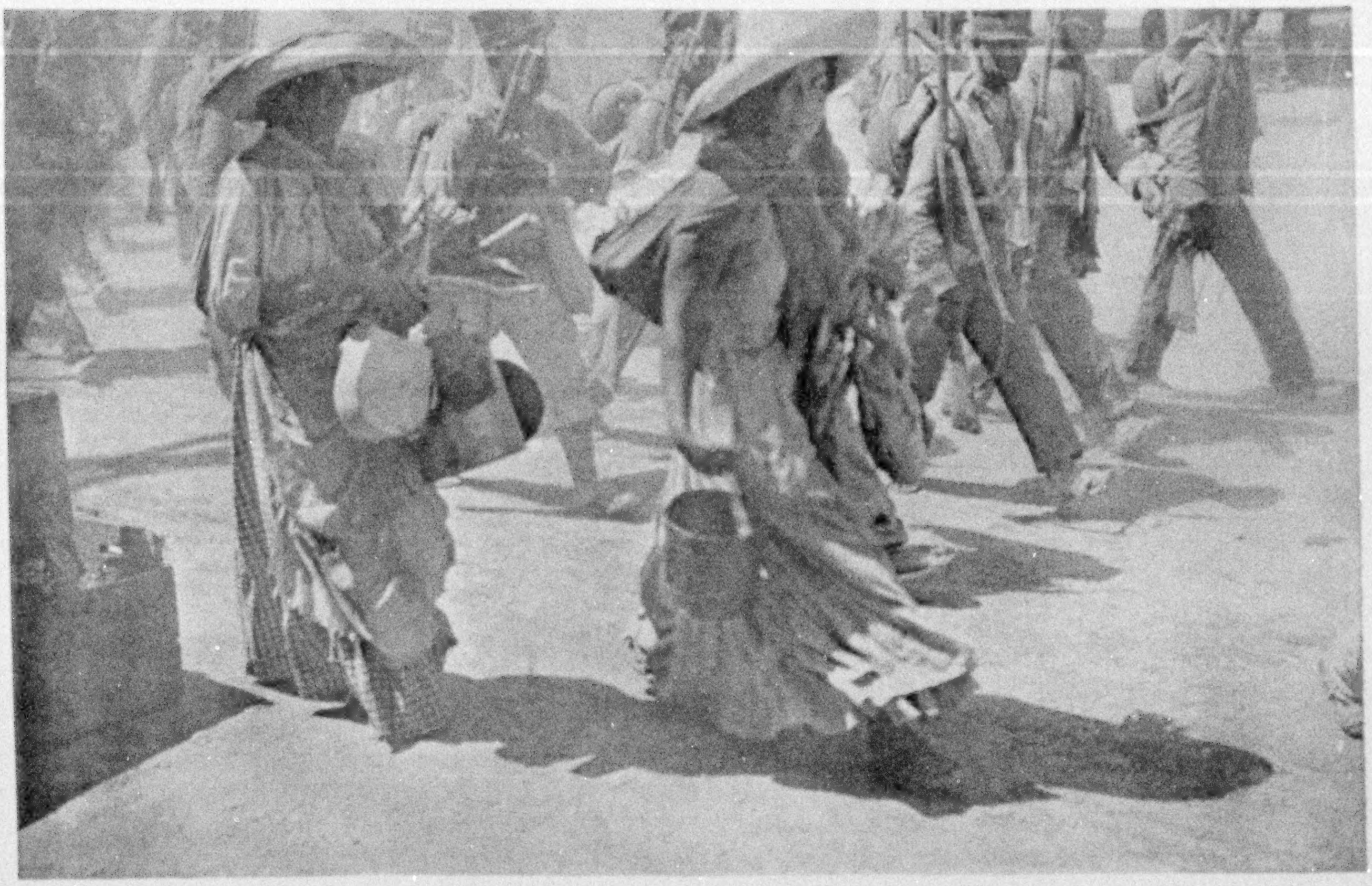


Photo by Shirley C. Hulse

THE MEXICAN FEDERAL ARMY GOES NOWHERE WITHOUT ITS WOMEN

Soldiers are supposed to be paid daily and to look out for themselves as regards food and supplies of all sorts. The women forage and cook and take the place of a regular organized commissary department. At times they take active part in battle, and they are said to leave nothing of value on the field after the fight.

which are used in Mexico. These frames are made somewhat like curtain-stretchers, and from 5 to 15 girls gather around one of them and work for days and even months on the beautiful drawn-work table-cloths which come from Mexico.

The best drawn-work is made from imported Irish linen, and the prices at which these pieces are sold, considering the work put on them, is ridiculously low. Pieces may be bought in Mexico City for $40 which could not be duplicated in the United States for $200. The designs are in endless variety, and each piece is so finely fashioned that it takes a woman's eye to tell which is the right and which is the wrong side.

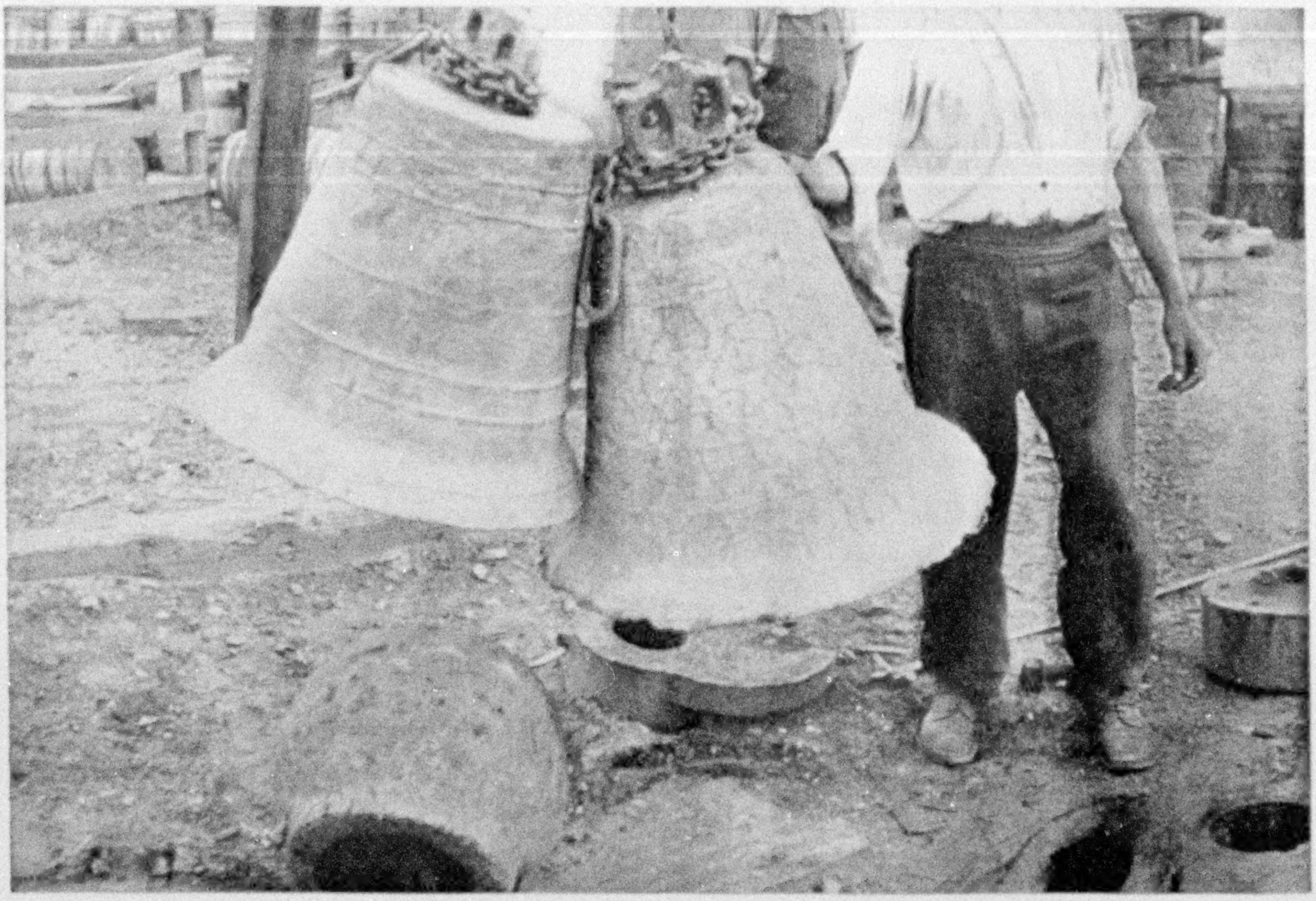
The Indians make all sorts of small objects to attract the centavos of the tourist. The little dolls of Cuernavaca, a half-inch tall and dressed in finely embroidered raiment, are the admiration of every one who sees them. The small clay animals, perfectly fashioned and ranging from the peaceful dog to the charging bull and the bucking mule, would do credit to the genius of many a sculptor whose name figures in the art publications of the world.

DRESSED FLEAS

But perhaps most wonderful of all are the tiny dressed fleas which may be bought in Mexico City. They are mounted in little boxes which are a little more than a quarter of an inch each in dimension. Here are a bride and groom, the former with her bridal veil and orange blossoms and the latter with his Prince Albert coat and silk hat; here are two ballet dancers dressed in true Spanish dancing costumes; here a bull fighter in full regalia; here a water-carrier with his water-jug.

Another wonderful work of the Indians is the making of feather pictures from the plumage of humming-birds, now almost a lost art. Several persons are employed on each picture, blending the various colors of the feathers together in a way requiring extraordinary patience and care.

XUM



OLD BELLS WHICH WERE MELTED AND CAST INTO CANNON BY THE FORCES OF GENERAL MANUEL CHAO AT PARRAL, CHIHUAHUA, IN 1913

The sketch of the figure to be reproduced is first made, and each artist takes charge of one particular part of the figure or drapery. When each has finished his share all of the different parts are reunited and the picture formed. Then the whole feather picture is placed on a plate of copper and gently pressed together with a sort of paste until the surface became even. Because of the splendor and liveliness of the colors, they appear even more beautiful than the paintings which they imitate.

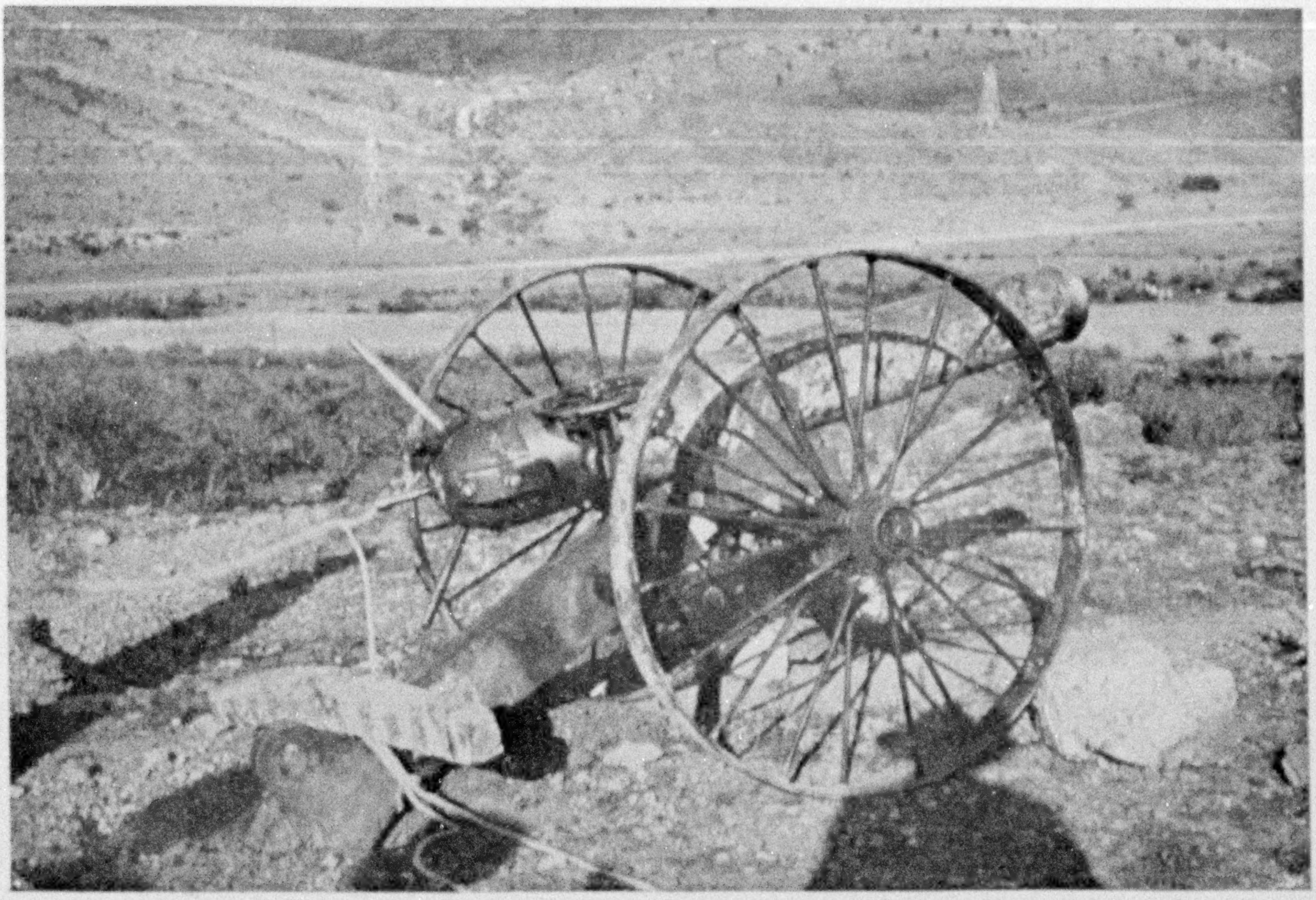
MEXICAN DYES

The fine and fast colors made by the Indians of Mexico and their mastery of art of hand-weaving has excited the wonder of travelers for many generations. Their multi-colored serapes, in which all of the tints of the rainbow are blended with a rare harmony and a keen appreciation of color values, are perfect specimens of the weaver's art.

Many of the Indian colors are made from Mexican insects, the best known of which is the cochineal. At a time beyond recorded history the Zapotec Indians discovered that the dry bodies of the female cochineal was superior even to the scarlet grain used to impart rich and lasting color to their clothes. Until 1703 it was believed that the cochineal was a seed or bloom of the plant. The insects feed on the leaves of the cochineal fig and other closely allied cacti. They remain attached to the spot on the leaf where they were hatched, and their bodies grow rapidly as they absorb the juice of the cacti, until all of their extremities are indistinguishable to the naked eye. It takes about 70,000 of them, when dried, to weigh a pound. Some are killed in ovens, which causes them to develop a grayish red color, and they are then known as the silver cochineal. The insect bears a close resemblance to the American wood-louse.

TORCHES AND LANTERNS MADE OF FIREFLIES

A remarkable insect found in Mexico is the Elater firefly. Seen by day, it is a large beetle, of a greenish-black color and about an inch long. Behind the eyes are two round transparent nodules about as large as a pin-head and filled with a



CANNON, "EL PADRE," MADE BY MEXICAN REVOLUTIONISTS FROM OLD BELLS SHOWN IN THE PRECEDING PICTURE

luminous substance. When roused, the insect seems perfectly saturated by this luminous secretion.

Four of these fireflies will throw a fairly brilliant light, by which the pages of a newspaper may be read. They fly only after dark, and resemble fiery dragons sweeping through the air, carrying lanterns. The Indians use them as miniature torches; the men fasten them to their ankles in going through the forest, and the women wear them in their hair under a thin gauze veil.

Tiny little cages are constructed in which three or four are kept for lighting purposes. The insects congregate by the thousands in many forest trees, and, as if by a preconcerted agreement, simultaneously flash their lights, then darken them and flash them again.

CURIOUS INDIAN FOODS

The Indians of Mexico eat many curious foods. One of the most remarkable of these is made of the eggs of a species of marsh fly. This fly deposits its eggs in incredible quantities upon flags and rushes. These eggs are gathered and made into cakes which are sold in the markets. These little cakes are somewhat like brickbats, and the Indians enjoy a meal of them with as good a stomach as white people enjoy cheese. They call the eggs water-wheat. They resemble fine fish roe, and when mixed with corn meal and fowl eggs form a staple article of diet, particularly during Lent.

The insects themselves, which are about the size of a house-fly, are captured, pounded into a paste, boiled in corn husks in much the same fashion as tamales, and in this form are eaten.

The Indians have a systematic method of cultivating their water-wheat. They plant bundles of reeds a few feet apart, with their tops sticking out of the water. On these the insects deposit their eggs. The reeds are then removed and the eggs shaken off on a sheet.

MEXICO CITY

In all the world one cannot find a more remarkable capital than Mexico City. Situated in a valley whose floor is a mile and a half above the level of the sea, and

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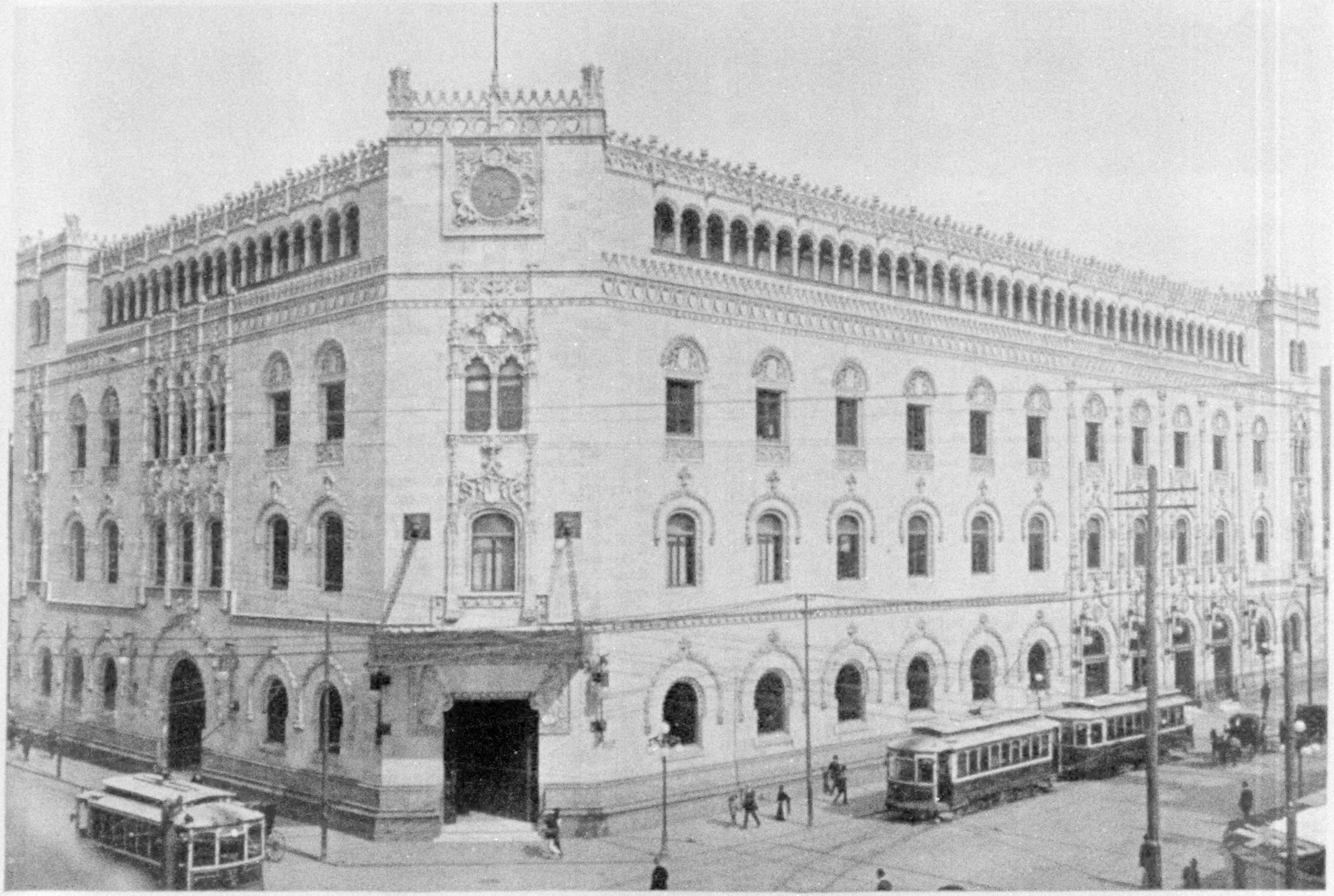

Photo from Alberto L. Godoy

THE POST-OFFICE: MEXICO CITY

"Mexico City is the most complete mixture of the ancient and the modern to be found in the New World. The old city might date anywhere from the tenth century, from its appearance. The new city is ultra modern, and you step from the sixteenth to the twentieth century by walking across the street. In the new part of the city there are miles of streets, with magnificent homes on both sides, that remind one of Massachusetts avenue between Dupont Circle and Sheridan Circle in Washington or of Riverside Drive in New York" (see text, page 489).

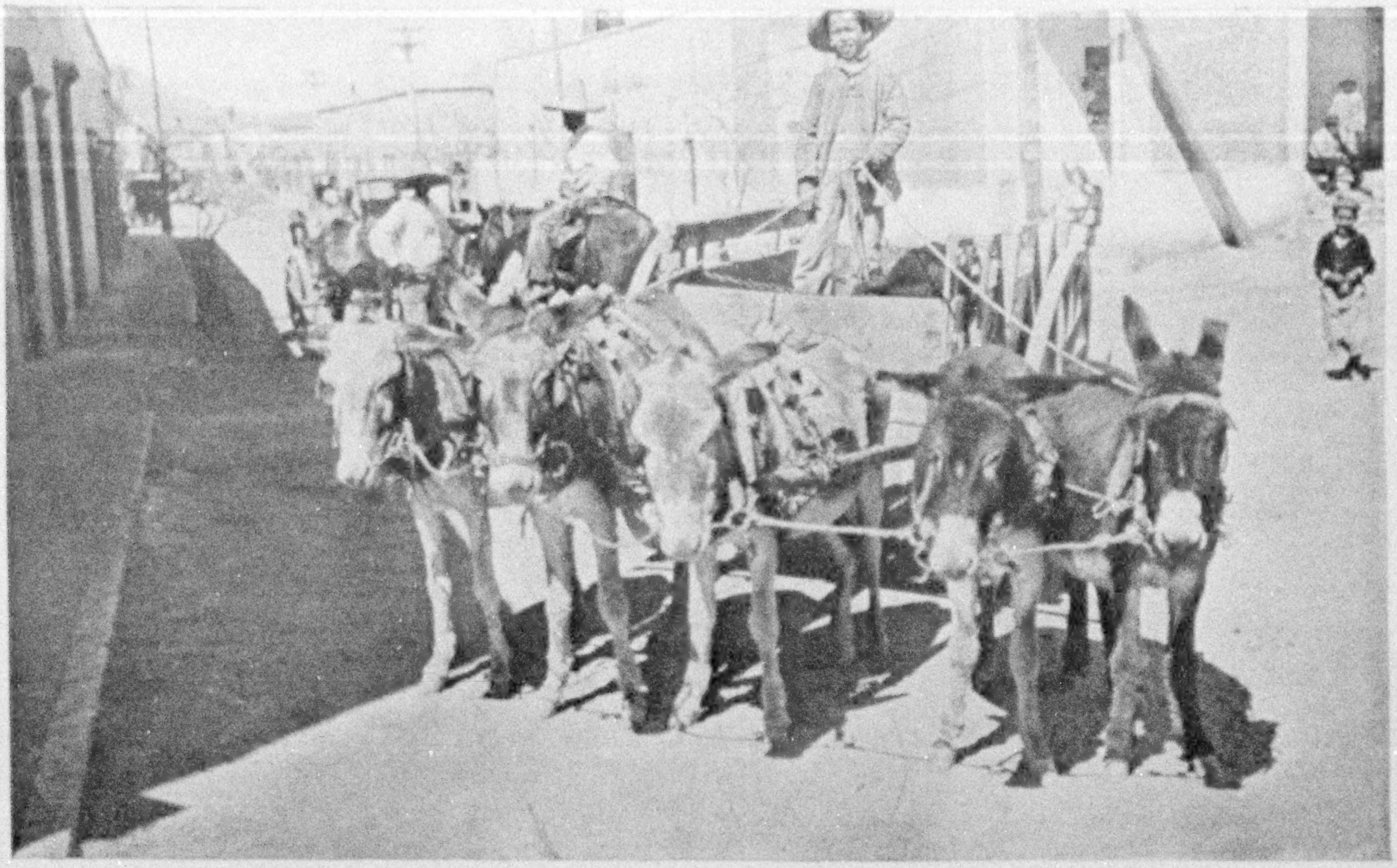

Photo by Shirley C. Hulse

THE BURRO—SOMETIMES SPOKEN OF AS THE MEXICAN CANARY

This animal is admirably suited to the needs of the Mexican peon. He is the personificaton of patience. About all that any one ever does for a burro is to make him work or to collect 15 pesos for his remains after he has stolidly permitted himself to be run over on a railroad. The process of making a burro work often entails what might seem to be considerable brutality. If the Mexican has any feeling for animals, he rarely exhibits such feeling in the presence of a foreigner; but the burro never seems to mind. The longer you observe him working or eating, or merely in a trance, the more surely will you wonder whether he is a stoic or whether he, too, is unfeeling as regards animals, until you hear *and see* him burst forth into song. Then you *know* that the burro is neither stoic nor clod. He has great feeling—all the feelings. He simply lacks means of expression excepting that of song, and in song he pours out all his joys and hopes, all his suffering and anguish, his longing, his very soul.

whose borders are surrounded by towering mountains; located where the beautiful volcanoes, Popocatepetl and Ixtaccihuatl, rear their snow-capped heads above the plain and stand eternal guard over it, its situation is one of rare beauty and grandeur. Its climate is mild, the temperature ranging from 35 to 75 degrees, with a mean of 65 degrees. No man sleeps without a blanket in Mexico City, nor needs an overcoat at midday.

Prior to the conquest the lakes of the Mexican Valley were extensive and the barges of the Aztecs sailed uninterruptedly from the gates of Chapultepec to Ixtapalapa. A large number of canals intersected the ancient metropolis of Tenochtitlan and connected with the lakes in the suburbs, making it a sort of new world Venice.

In 1607 the celebrated Portuguese engineer Martinez undertook to drain the Valley of Mexico by cutting a canal through the mountains. From 12,000 to 15,000 Indians were forced to do the work, which was considered complete 11 months after its inception. The work, however, was largely a failure, since it drained only one small lake and an unimportant river, leaving lakes Texcoco and Chalco still perpetual menaces to the city.

In 1879 a huge drainage canal 30 miles long was begun, which was completed in 1900, at a cost of about $8,000,000, American gold. Its completion removed the danger of inundations from Mexico City and solved the problem which occupied the thoughts and engendered the fears of the Aztecs as far back as 1449.

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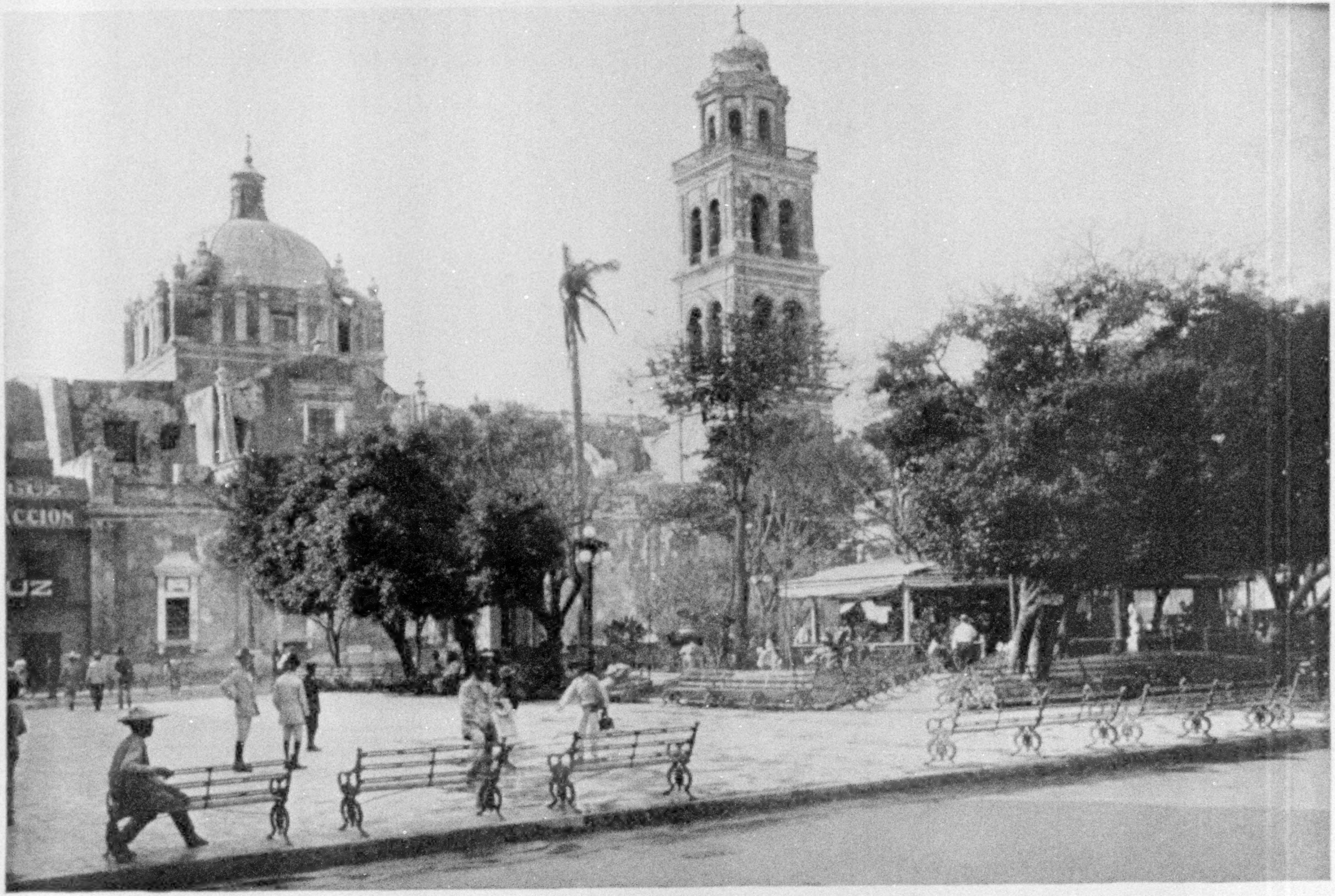


Photo from Alberto L. Godoy

LA PLAZA: VERA CRUZ

Vera Cruz, like every other Mexican city and town, has its principal plaza, where the people come to promenade and to hear the military bands play. In some of the cities unaccompanied women keep to the right and unaccompanied men to the left, promenading in opposite directions.

This great drainage canal starts at a point east of the city and, winding its way between the Guadalupe range and Lake Texcoco, ends near the town of Zumpango, after crossing the Guadalupe River by means of a great aqueduct. The depth at the starting point is 16 feet and at the terminal 65 feet. At one place it was necessary to tunnel the Xalpan Mountain, this tunnel being about 7 miles long.

Mexico City is the most complete mixture of the ancient and the modern to be found in the New World. The old city might date anywhere from the tenth century, from its appearance. The new city is ultra modern, and you step from the sixteenth to the twentieth century by walking across the street. In the new part of the city there are miles of streets, with magnificent homes on both sides, that remind one of Massachusetts avenue between Dupont Circle and Sheridan Circle in Washington or of Riverside Drive in New York.

THE PARADE OF SOCIETY

The parade ground of Mexico City is the Avienda de San Francisco. This short street extends from the Mexican White House to the Alameda, and is only about 24 feet from curb to curb. Here, at the approach of twilight, every smart equipage in the capital comes. Down the one side of the street and up the other side moves the procession at a slow walk, while everybody looks at everybody else.

It is not bad manners to look at the beautiful ladies and their large families of children—rather it would be distinctly bad manners not to, for this is a parade both for seeing and being seen. Even the moving-picture playhouses are provided with balconies, where the patrons may go between reels to watch the passing show.

Once the government, back in the days of Diaz, when no hand dared dispute its authority, ordered the parade to move down Avienda de San Francisco and to return via Cinco de Mayo street, but that took the privilege of seeing the returning crowd away from those going in the opposite direction, and even the firm hand of the law couldn't overrule the order of society; so that even now, in the days of revolution, the parade still goes down one side of Avienda de San Francisco and up the other side.

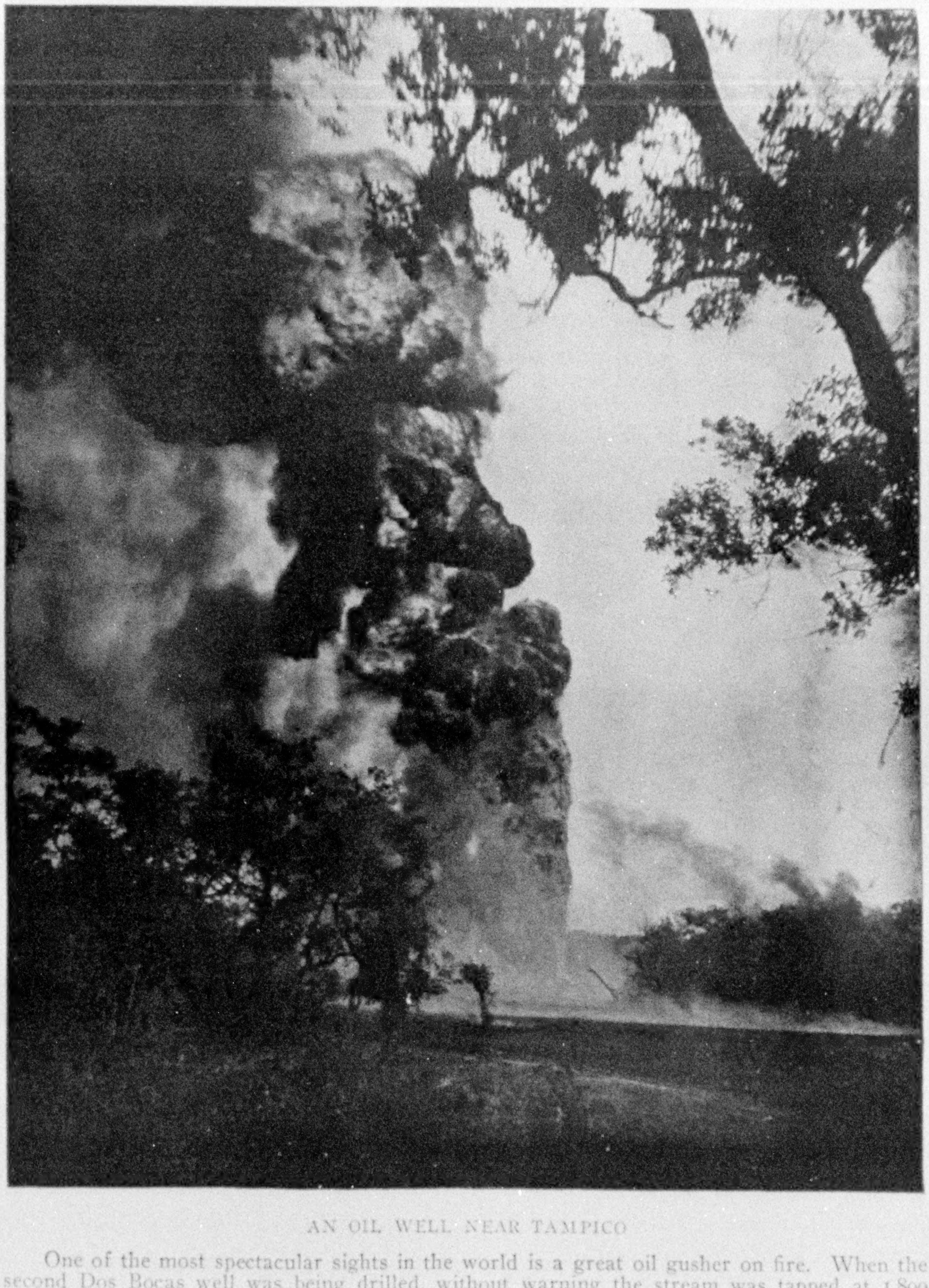
As Avienda de San Francisco unites the old and the new cities, so does the Cinco de Mayo (Fifth of May) unite the cathedral, stateliest of all the religious edifices on the continent, with the theater, most beautiful, although unfinished, of all the amusement places in America. The Cinco de Mayo is the Wall Street of Mexico, and the buildings which line it are modern in every respect.

The Paseo de la Reforma, extending from Chapultepec to the Avienda de Juarez, a short avenue connecting the Paseo with Avienda de San Francisco, is one of the finest driveways of the world. Passing through the new city, with two driveways divided by a lane of tropical trees and flowers, with here and there a beautiful circle and a splendid monument, there is nothing in the New World or the Old that surpasses it. The most magnificent mornings anywhere to be found smile down on it winter and summer, and no traveler who ever drove up the Paseo de la Reforma in the forenoon can forget that drive, even though he has seen all the famous avenues of the world.

The city is full of interesting places. Whether it be the cathedral, which rears its majestic towers to heaven on the very spot where the sacred temple of the Aztecs stood, and where tens of thousands of human beings were sacrificed to the sun; whether it be the Hospital de Jesus, built on the site where Cortes and Montezuma first met, and supported to this day from the revenues of the estate of Cortes; whether it be the Jockey Club, housed in the beautiful House of Tiles; whether it be the bronze equestrian statue of Charles IV of Spain, declared by Humboldt to be second only to the statue of Marcus Aurelius at Rome, or whether it be Chapultepec, with its memories of the American triumph in Mexico, there is no place with more attractions from a historic standpoint than Mexico City.

A PRACTICAL CHARITY

The national pawn shop is one of the unique institutions of the capital. It was



AN OIL WELL NEAR TAMPICO

One of the most spectacular sights in the world is a great oil gusher on fire. When the second Dos Bocas well was being drilled, without warning the stream was tapped at 1,800 feet, and before the men could put the fire out of the drilling engine the gushing oil spread over the ground and took fire from the engine. It was estimated that from 60,000 to 75,000 barrels of oil were consumed each day for nearly two months. The cost of extinguishing the fire and capping the well was $3,000,000. During the height of the fury of the fire the flames reached an elevation of 1,400 feet and a width of 75 feet. Newspapers could be read at a distance of 17 miles, headlines at 33 miles, and ships could see the fire 100 miles away.

founded by Pedro Jose Romero de Terreros, the owner of the fabulously rich mines at Real del Monte. Here money may be borrowed on chattels at very low rates of interest, and everything is pledged, from a pair of cock's spurs to an automobile and from a silver ring to an iron safe. The smallest loan made is 12 cents and the largest $4,000.

The clerk who makes the loan must repay it out of his own pocket if the pawn is not redeemed or cannot be sold for a sum equivalent to the loan. Unredeemed pledges are marked with prices at which they will be sold, and every five months this price is marked down lower, until it finds a buyer, or until the point is reached where the clerk must pay the loan and take the pawn himself.

About 40,000 articles are pawned each month. The interest on loans amounts to about $20,000 a month. All profits go to the extension of the business.

From the American standpoint burial customs in Mexico are very strange. A grave may be rented in perpetuity or for a term of years. If the latter option is taken and the rent is not paid promptly at each recurring period, the bones of the occupant are ejected and thrown upon a great bone pile. These bones from time to time are cremated.

At Mexico City's great city of the dead, where 160,000 people have been buried, there is a cave which contains hundreds of tons of human ashes. The Mexican law forbids services at the grave since the separation of church and state under Benito Juarez.

Nothing is more heartrending than to witness a funeral of a child among the poor, and infant mortality is terribly high among them. Too poor to buy a coffin, they must content themselves with renting one. They place their own child in it, the husband takes it upon his shoulder, and together the family march to the grave, where the child is removed from the coffin and put into the ground, with nothing to protect it from the cold earth but its little cotton shroud. Those who are better off use a street-car hearse and buy coffins for their dead.

THE MEXICAN PEOPLE

The most conspicuous thing about the male population of Mexico, so far as the masses of half-breeds are concerned, are their hats. These are bought even if their purchase does force the buyer to go hungry for months afterwards, for the peon is not nearly as much a slave to his haciendado as he is to his hat.

At one time the brims of the Mexican sombrero got so wide that the hats had to be tipped sidewise to be gotten into the cars, so the government resorted to a tax of $1 for each 4 inches of brim above a certain width.

Grandiloquent promises and exaggerated courtesy is the characteristic of the people. To be "muy simpatico," heartily congenial, is the first law of their social code. Everybody puts his house at your disposal; it is yours. But nobody means even to entertain you as his guest unless he says so in as many words. If you admire a piano, a watch, a house, or a hacienda, it is yours instantly, although you never get it.

The Mexican loves companionship. When he meets an old friend he hugs him to his heart, figuratively and literally, and with many pats upon his back calls him the friend of his youth. He bows whenever he enters a public place, ostensibly to the person nearest the door, but in reality to the whole crowd.

Beggars flourish everywhere, and of all the woe-begone, bedraggled, miserable-looking creatures on the face of the earth, commend me to the Mexican beggar. "Un centavo, señor," rings in your ear day and night. Begging and looking wretched with them is an art whose mastery they begin to strive for while still babes in arms. They invoke the blessings of the saints and the love of God upon you when asking for alms and when receiving them, and the only way that yet has been discovered to get rid of them is to say "Pardoneme por Dios"—"Pardon me in the name of God." That is even a better way and a much more satisfactory one than calling the police.

Once I was passing through a little town above San Luis Potosi, when I saw a bunch of little half-breeds ranging from

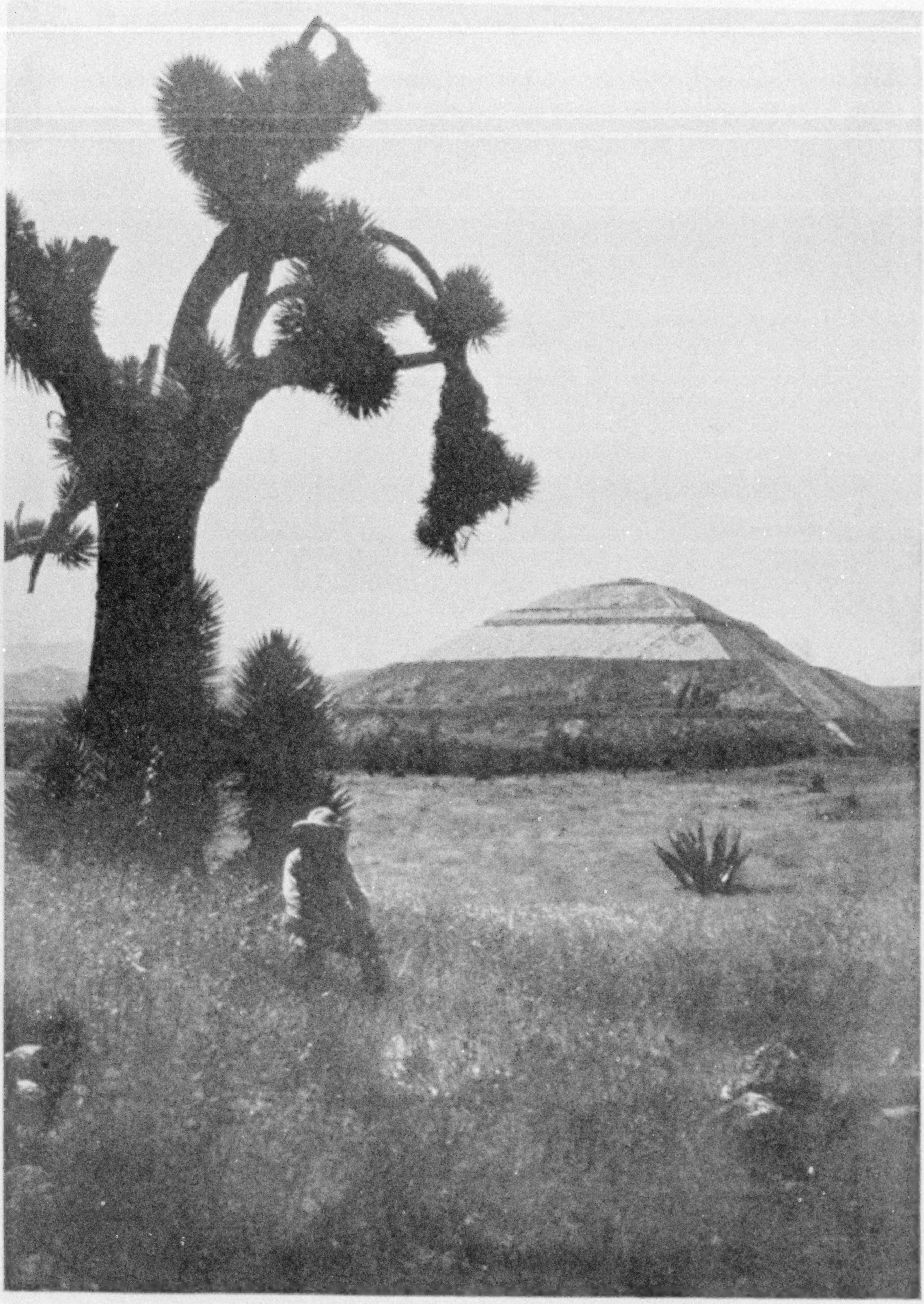


Photo from Alberto L. Godoy

THE PYRAMID OF THE SUN: SAN JUAN, TEOTIHUACAN, NEAR MEXICO CITY

"The monuments left by the Aztecs and their predecessors in Mexico tell of a surprising ancient civilization. . . . The Pyramids of the Sun and Moon, near Mexico City, while not as large as those of Egypt, bear wonderful inscriptions" (see text, page 493).

ten years down to a baby about a year old. I gave the baby a "cinco centavo" piece, and right before my eyes a little scoundrel about eight grabbed it away from the baby and ran. I tried the same experiment in several other places, with about the same result. Mexico is the only place I have ever visited where they steal from the babies.

Mexico is a land of holidays. Counting Sundays, there are 131 on the Mexican calendar, and it is asserted that more than half of the people observe them all. There are 52 saints' days, 15 solemn feast days, 3 holy days, and 6 family feast days. On certain of these days all Mexico takes to the festival, and it usually requires from one to three days for the peons to sober up and get back to regular work again.

A SPLENDID ANCIENT CIVILIZATION

The monuments left by the Aztecs and their predecessors in Mexico tell of a surprising ancient civilization. Where once the Americans and the Mexicans engaged in deadly combat at Churubusco, and where until recently they fraternized at the beautiful Country Club long years before the astronomical observatory at Uranienborg was built, there arose an Aztec astronomical observatory. The Aztecs fixed their year with a determination of the actual time between the equinoxes more accurate than that of the Alexandrian scholars who made the Julian calendar. The latter calendar today is some 13 or 14 days out of accord with the seasons, while the Aztec calendar is only a few hours out of agreement with the equinoxes. They wrote their calendar on a great circular stone 22 feet in diameter, 3 feet thick, and weighing some 24 tons. The inscriptions on it have been worked out and the Aztec system of time reckoning ascertained.

The Sacrificial Stone, containing a carved portrayal of the rights of sacrifice of the Aztecs, is also to be found in the National Museum, and a copy of it is in our own National Museum. Tens of thousands of victims were offered up on this stone to the sun-god of the Aztecs, the principal part of the sacrificial rite being the plucking out of the yet-beating heart of the victim and holding it up to heaven.

The Pyramids of the Sun and Moon, near Mexico City, while not as large as those of Egypt, bear wonderful inscriptions. The Chinese Minister to Mexico declares that one of these inscriptions occurs on the majority of tombs in China.

From the ruins of Palenque, known to have existed before the coming of Columbus, there was taken some years ago a tablet which shows, in bas-relief, two Indians standing in reverential attitude before a cross.

The earliest people who seem to have left any trace of their occupancy of the land in Mexico were the Toltecs. They were followed by the Chicemecs, called the barbarians of the North, and believed by some to have been the progeny of a race of people who came to the American continent either by way of the frozen Bering Straits or were borne across the seas by the Japan current.

Whether viewed from the standpoint of its past, contemplated from the standpoint of its present, or considered from the standpoint of its future, Mexico is now the great question-mark of the Western World. It will be a long, long climb until its population, four-fifths Indians and half-breeds, will reach that point in their national destiny where they can possess a government like our own. It will be years before the tragic days of the present can be wiped out and before the uncounted riches of its wonderful mineral and agricultural resources can be fully capitalized.

But somehow, some day, Mexico will find that peace that is based on a united desire for peace and a united purpose to have it, and then Mexico will go forward as our own country has gone forward in the last fifty years.

BIRDS OF TOWN AND COUNTRY

BY HENRY W. HENSHAW

CHIEF OF THE BIOLOGICAL SURVEY

The 64 colored pictures of common birds of the United States, which illustrate the following article by Dr. Henshaw, were prepared especially for the NATIONAL GEOGRAPHIC MAGAZINE *by the artist-naturalist, Louis Agassiz Fuertes, and represent many months of work by him and by the engraver and printer. As in the June, 1913, number, the* GEOGRAPHIC *printed a collection of 50 birds in colors, also by Louis Agassiz Fuertes, with text by Dr. Henshaw, it has now given its readers, at the cost of many thousands of dollars, a complete pictorial description of the 114 more common birds of our country.*

The Magazine has received so many requests for separate copies of the article printed last year that arrangements have been made for binding substantially in one volume both of the above articles; also the article by Frederic H. Kennard, "Encouraging Birds Around the Home," with 36 illustrations, which was printed in our March, 1914, number, and the original contribution, "Our Greatest Travelers: Birds that Fly from Pole to Pole; Birds that Make 2,500 Miles in a Single Flight," by Wells W. Cooke, in our April, 1911, issue. A limited number of copies of this valuable collection, substantially bound in cloth, may be obtained at the office of the National Geographic Society at $1.00 each (bound in leather, $2.00).

FROM very ancient times birds have appealed to the interest and imagination of mankind. They have furnished themes for innumerable poets, have appeared in many guises in primitive religions, and by their flight inspired the predictions of the soothsayers of old. In these modern and prosaic times birds still continue to interest mankind, and the last decade has witnessed a marked strengthening of the sentiment toward them.

The present interest is direct and personal, and today hundreds of thousands of men and women in various parts of the country, old as well as young, are employing much of their leisure in familiarizing themselves with the birds of their respective localities. In following birds afield, in studying their habits, and listening to their songs, they bring themselves into close touch and sympathy with nature and add new zest to life—a zest, be it noted, which enriches without harm to any creature.

Would that the same could be said of the sportsman who almost invariably is at heart a nature lover, though the primitive instinct to kill is uppermost. Many sportsmen, however, who formerly followed wild creatures only to kill, have abandoned the use of rifle and shotgun, and today are finding greater pleasure in studying and photographing their former quarry than they did in pursuing it with murderous intent. A real interest in living outdoor wild life leads naturally to a love of nature in all her varied manifestations, and this, in all lands and under all circumstances, remains a source of lasting pleasure.

A love of birds from the esthetic side, however, is of comparatively recent development and had little place among primitive peoples, who utilized birds chiefly in two ways—for food and for ornament. Feathers, especially, appealed to them for purposes of adornment, and this barbaric taste has not only survived among civilized races, but in recent years has developed to an extent which threatens the very existence of many of the most beautiful and notable species of birds in various parts of the world. No region is too remote, no forests too deep, no mountains too high to stay the plume-hunter, stimulated by the golden bribe offered by the tyrant Fashion.

Happily, America has taken the lead in an attempt to restrict this craze for feather adornment, which means nothing less than the death of millions of beautiful and useful creatures. Nor are evidences wanting that other countries as well have recognized the gravity of the situation and are preparing to pass protective laws similar to those recently enacted in this country.

BIRDS ARE THE FARMERS' MOST EFFICIENT ALLIES

While birds appeal to the regard and interest of man from the esthetic side as no other creatures do, there is another and even more important point of view, and it is no doubt true that of late years interest in birds has been greatly stimulated by the discovery that they possess an economic value. Indeed, so great is their value from a practical standpoint as to lead to the belief that were it not for birds successful agriculture would be impossible.

The study of the economic side of bird life and of the relations of birds to the farmer and horticulturist have been greatly stimulated in the United States by Federal aid and supervision, and in no other country in the world have the activities of birds been so carefully investigated with reference to their practical bearing. Under the Biological Survey of the Department of Agriculture, for instance, is a corps of trained men, who study the food of birds by careful examination of the stomachs of specimens killed for scientific purposes. The information thus gained is supplemented by observations in the field, and the result is a large amount of invaluable data illustrative of the economic relations of many kinds of birds. This storehouse of information has been largely drawn upon in the following pages.

OUR COUNTRY IS PARTICULARLY FORTUNATE IN THE NUMBER AND VARIETY OF ITS BIRDS

It would be strange indeed if our land, with its vast extent of territory, its diversified landscape, its extensive forests, its numerous lakes and streams, with its mountains, prairies, and plains, had not been provided by Nature with an abundant and diversified bird life. As a matter of fact, America has been favored with a great variety of birds famed both for beauty and for song. America also possesses certain families, as the humming-birds and wood-warblers, the like of which exist nowhere else in the world.

In considering the many kinds of birds in the United States from the practical side, they may not inaptly be compared to a police force, the chief duty of which is to restrain within bounds the hordes of insects that if unchecked would devour every green thing. To accomplish this task successfully, the members of the force must be variously equipped, as we find they are. Indeed, while the 1,200 kinds of birds that inhabit the United States can be grouped in families which resemble each other in a general way, yet among the members of the several families are marked variations of form and plumage and still greater variation of habits, which fit them for their diversified duties.

As the bulk of insects spend more or less time on the ground, so we find that more birds are fitted for terrestrial service than for any other. Our largest bird family, the sparrows, is chiefly terrestrial, and although its members depend much upon seeds for subsistence they spend no little share of their time searching for insects. They are ably aided in the good work by the thrushes, wrens, certain of the warblers, and many other birds.

Another group is of arboreal habits, and plays an important part in the conservation of our forests, the true value of which we have only recently learned to appreciate. So many insects burrow into trees that a highly specialized class of birds — the woodpeckers — has been developed to dig them out. The bills, tongues, feet, and even the tails of these birds have been cunningly adapted to this one end, and the manner in which this has been done shows how fertile Nature is in equipping her servants to do her bidding.

The bark of trees also forms a favorite shelter for numerous insects, and behold the wrens, nuthatches, warblers, and creepers, with sharpest of eyes and slenderest of bills, to detect our foes and to dislodge them from crack and cranny.

The air is full of flying insects, and to take care of these there are the swallows, swifts, and night-hawks, whose wings and bodies are so shaped as to endow them with the speed and agility necessary to follow all the turns and windings of their nimble insect prey.

The whippoorwills, swift of wing and with capacious mouths beset with bristles, attend to the night-flying insects when most birds are asleep, while the hawks by day and the owls by night supplement the work of other birds and have a special function of their own, the destruction of noxious rodents.

Thus every family of birds plays its own part in the warfare against insects and other foes to man's industry, and contributes its share to man's welfare.

Birds would fall far short of what they accomplish for man were they not the most active of living things. It is curious that the group of vertebrates which live the fastest—that is, have a higher temperature and a more rapid circulation than any other—should be related by descent to a family of such cold-blooded creatures as the reptiles and lizards, which often go without food and hibernate for considerable periods. Very different is it with birds. Few realize the enormous quantity of food required to sustain the energy of these creatures, most of whose waking hours are spent in a never-ending search for food.

In satisfying their own hunger birds perform an important service to man, for notwithstanding the fact that the acreage under cultivation in the United States is larger than ever before, and that the crops are greater, the cost of foodstuffs continually mounts upward. Meanwhile the destruction of farm and orchard crops by insects and by rodents amounts to many millions each year, and if any part of this loss can be prevented it will be so much clear gain.

The protection of insectivorous and rodent-destroying birds is one of the most effective means of preventing much of this unnecessary loss, and the public is rapidly awakening to the importance of this form of conservation. From the farmers' standpoint, such birds as the bobwhite, prairie-chicken, the upland plover, and the other shore birds are worth very much more as insect eaters than as food or as objects of pursuit by the sportsman. This statement applies with especial force to such species as the prairie-chicken, which everywhere in its old haunts is threatened with extinction.

BIRDS CHECK RAVAGES OF DISEASE-CARRYING INSECTS

The value of birds to the farmer is plain enough, but we do not usually think of birds as having any direct relation to the public health. To prove that they do, however, it is only necessary to state that 500 mosquitoes have been found in the stomach of a single night-hawk; that in a killdeer's stomach hundreds of the larvæ of the salt-marsh mosquito have been found, and that many shore birds greedily devour mosquito larvæ. As mosquitoes are known to carry the germs of such serious diseases as dengue fever and malaria, it is evident that by destroying them birds are conferring an important benefit on man. It may be added that not infrequently ticks are eaten by birds, and that the tick responsible for the spread of Texas fever among cattle has been found in the stomach of the bobwhite.

Since birds perform such invaluable service, every effort should be made to protect the birds we now have and to increase their numbers. This can be done in several ways: (*a*) by furnishing nesting boxes for certain species to nest in, as swallows, martins, wrens, woodpeckers, great-crested flycatchers, and others; (*b*) by planting berry-bearing shrubs about the farm or orchard as food for the birds in winter; (*c*) by the establishment of bird santuaries, where birds may be reasonably safe from their natural enemies and be permitted to live and breed in absolute security as far as man is concerned.

Here, again, the National Government, taking the lead, has set apart no less than 64 bird refuges in various parts of the United States. These for the most part are rocky, barren islands of little or no agricultural value, but of very great usefulness in the cause of bird protection. The example thus set is now being followed by certain States, as Oregon and Wisconsin. Several private citizens also have acquired islands for the purpose of making bird preserves of them; others not only prevent the destruction of wild life on their forested estates, but go much farther, and endeavor in various ways to increase the number of their bird tenants.

Efforts to protect birds on a smaller scale and to attract them about dwellings, with a view to their close companionship, are worthy of all praise, and such efforts should be far more common in this country than they are at present, particularly as the means involve little trouble or expense. The presence of trees and shrubbery near the house is of itself an open invitation to birds which they are eager to accept, particularly if the shrubbery is not too closely pruned. Birds like thick vines and tangles, in the recesses of which they feel safe from their many enemies. Suet, nuts, and other bird foods, if exposed in conspicuous places, can usually be depended on to attract birds in winter, and often avail to save many lives, especially when snow covers the ground. In summer opportunities to drink and bathe are irresistible attractions to birds and largely increase the number resorting to any given neighborhood.

Last but not least important may be mentioned the element of safety from cats. Birds and cats do not thrive in the same neighborhood.

To awaken interest in the study of our bird neighbors is the chief object of this paper. The free use of colored illustrations to facilitate identification precludes the necessity for long and detailed descriptions. As all the birds illustrating the text are from the brush of the well-known artist, Fuertes, they need no commendation, but may be permitted to sing their own praises.*

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* The following birds were pictured and described in the June, 1913, number of the NATIONAL GEOGRAPHIC MAGAZINE: Bluebird, robin, russet-backed thrush, ruby-crowned kinglet, chickadee, white-breasted nuthatch, brown creeper, house wren, brown thrasher, catbird, mocking-bird, myrtle warbler, loggerhead shrike, barn-swallow, purple martin, black-headed grosbeak, rose-breasted grosbeak, song-sparrow, chipping sparrow, white-crowned sparrow, English sparrow, crow blackbird, Brewer's blackbird, Bullock's oriole, meadow-larks, red-winged blackbird, bobolink, common crow, California jay, blue jay, horned lark, Arkansas kingbird, kingbird, nighthawk, flicker, yellow-bellied sapsucker, downy woodpecker, yellow-billed cuckoo, screech-owl, barn-owl, sparrow hawk, red-tailed hawk, Cooper's hawk, morning dove, ruffed grouse, bobwhite, killdeer, upland plover, black tern, Franklin's gull.

KINGFISHER (Ceryle alcyon).

Length, about 13 inches. Not to be confused with any other American bird.

Range: Breeds from northwestern Alaska and central Canada south to the southern border of the United States; winters from British Columbia, Nebraska, Illinois, Indiana, Ohio and Virginia south to the West Indies, Colombia and Guiana.

The cry of the kingfisher, which suggests a watchman's rattle in vigorous hands, can be mistaken for the note of no other bird; nor, for that matter, is the bird himself likely to be confused with any other species. Whether flying, perched on a branch over a stream, or diving for small fish, our kingfisher is always himself, borrowing none of his peculiarities from his neighbors. Many of his tropical brothers catch insects for a living; but our bird, early in the history of the development of the kingfisher family, discovered that fish were easier to catch and in the long run more filling than insects, and hence renounced the family habit and assumed the role of fisherman. Instead of using a hollow tree as a nest site, the kingfisher has apparently learned a lesson from the sandswallows and excavates a burrow for himself in some sandbank, usually not far from pond or stream; and you may be sure that any pond chosen by him for a haunt is well stocked with fish. The fish he kills are chiefly minnows and of small value, but the bird sometimes makes a nuisance of himself about fish hatcheries, where his skill in catching young food fish often brings him speedy doom.

RED-HEAD (Melanerpes erythrocephalus).

Length, about 9¾ inches. Our only woodpecker with red head and broad white wing patch.

Range: From southern Canada to the Gulf Coast and from central Montana, central Colorado, and central Texas to the Hudson and Delaware. Generally resident, but more or less migratory in the southern parts of its range.

This strikingly marked and readily identified woodpecker is common in some localities and entirely wanting in others which apparently are equally well adapted to the bird's needs. Its habits are a combination of woodpecker, jay and flycatcher, and catching insects on the wing is a common habit. Though in general migratory, the bird is apparently indifferent to cold and other weather conditions, and winters wherever food abounds, especially where beechnuts, of which it is very fond, are plentiful. The red-head eats nearly twice as much vegetable food as it does animal, but the latter includes many destructive insects. For instance, it is greatly to its credit that it eats both species of clover beetles, the corn weevil, cherry scale and 17-year cicada. On the other hand, vigorous accusations are not wanting from various parts of the country of damage done by this species. It eats corn on the ear, and attacks many kinds of small fruits, including strawberries and apples. It is also guilty of robbing the nests of wild birds of both eggs and nestlings. It does some damage to telegraph poles by boring into them to make nests. No doubt some of these charges are well founded. For the most part they represent the occasional acts of individuals, or are local and not characteristic of the species as a whole.

RED-SHAFTED FLICKER (Colaptes cafer collaris).

Length, 12 to 14 inches. To be distinguished from its eastern relative (*C. auratus*) by its red mustache and nuchal band and the red wing and tail shafts.

Range: Rocky mountain region from British Columbia south to Mexico, west to the coast mountains in Oregon and Washington, and through California; largely resident.

Few birds are more widely known than the flicker, as appears from the fact, recorded by Chapman, that in the various parts of the country it appears under no fewer than 124 aliases. Though well known, the flicker is more often heard than seen, its loud call often proclaiming its presence when it is hidden among the trees. As a rule the flicker is shy and in some sections of the country it has good reason to be, since it is accounted a game bird and, as such, pursued for the table.

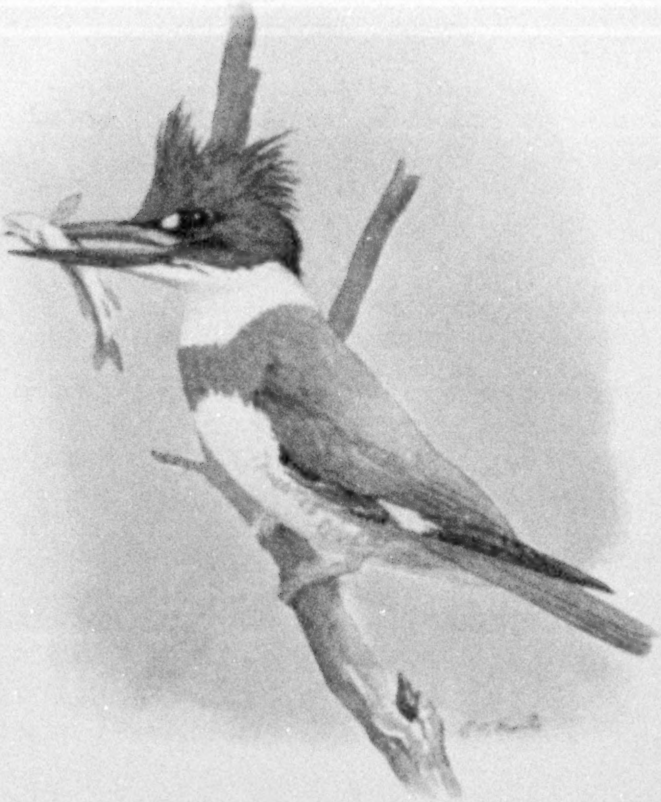
Though a woodpecker, the red-shaft departs widely from typical members of the tribe both in structure and habits. Notwithstanding the fact that its bill is not well adapted for boring into wood for larvæ, the bird manages to do considerable damage in the west by making holes, in church steeples, school houses and other buildings, to serve as roosting quarters. As it is nowise particular as to its domicile, it is possible materially to increase its numbers by putting up nesting boxes for its accomodation. The bird's subsistence is obtained largely from the ground, where it secures vast quantities of ants, for taking which its tongue is specially adapted; about one half its food in fact consists of these creatures. The flicker also consumes grasshoppers, crickets, and beetles, but it is so much of a vegetarian that the list of berries and seeds it eats is a long one, though it is not accused of taking domestic fruit.

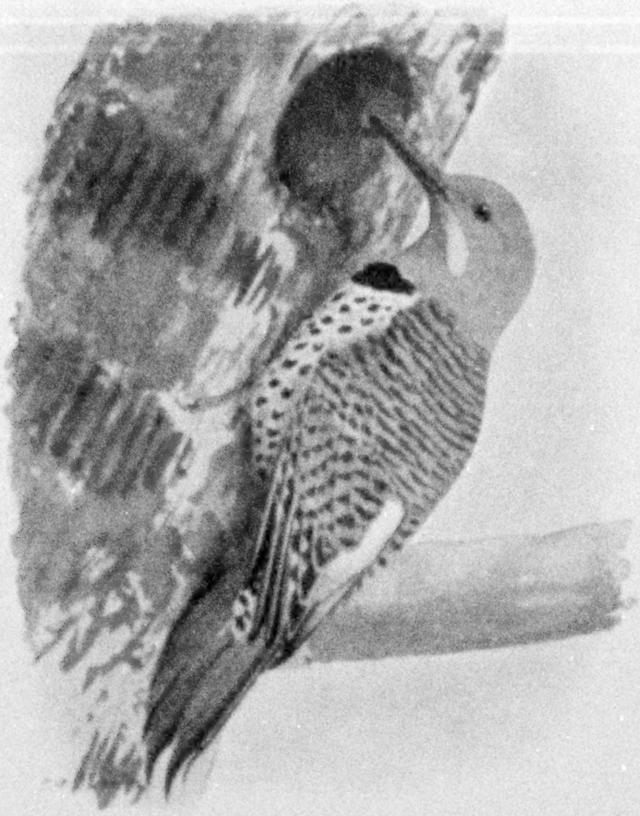
CALIFORNIA WOODPECKER (Melanerpes formicivorus and races).

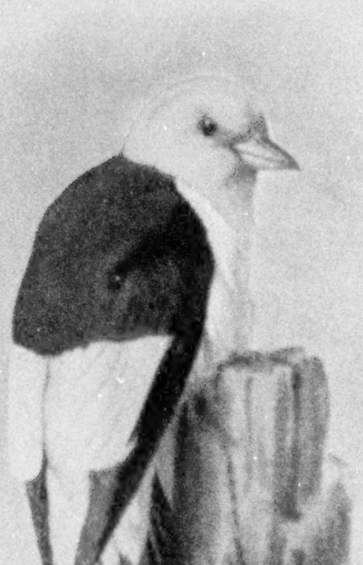
Length, about 9½ inches. Easily distinguished from its fellows by its general black color, white forehead, throat patch, belly and wing patch.

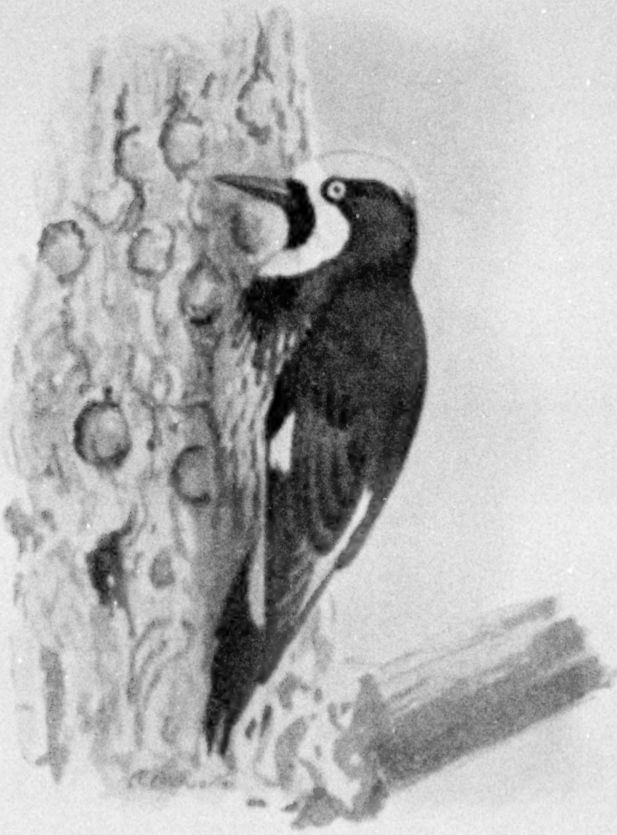
Range: Breeds from northwestern Oregon, California, Arizona, and New Mexico south through Lower California to Costa Rica.

The California woodpecker is a noisy, frolicsome bird and by all odds the most interesting of our woodpeckers. Its range seems to be determined by that of the oaks upon which it lives and from which it draws a large part of its subsistence. In California the bird is known to many by the Spanish name, *carpintero*, or carpenter, and its shop is the oak, in the dead limbs of which, as in the bark of pines, it bores innumerable holes, each just large enough to receive an acorn. That the birds do not regard the filling of these storehouses as work, but on the contrary take great pleasure in it, is evident from their joyous outcries and from the manner they chase each other in their trips from tree to tree like boys at tag. In California many of the country school houses are unoccupied during the summer and the woodpeckers do serious damage by drilling holes in the window casings and elsewhere with a view to using them as storage places. As long as the acorn crop lasts, so long does the storing work go on. Meanwhile the jays and squirrels slip in and rob the woodpecker's larder. Though this woodpecker eats insects, including some harmful ones, they form less than a third of its entire fare.









Kingfisher
Red-headed Woodpecker

Red-shafted Flicker
California Woodpecker

XUM

BLACK AND WHITE WARBLER (Mniotilta varia).

Length, about $4\frac{1}{4}$ inches. Easily known by its streaked black and white plumage.

Range: Eastern North America. Breeds from central Mackenzie, southern Keewatin, northern Ontario, Newfoundland, Nova Scotia and New Brunswick to eastern Texas, Louisiana, central Alabama and northern Georgia, west to South Dakota; winters in Florida and from Colima and Nuevo Leon to Colombia, Ecuador and Venezuela.

A warbler in form and general make-up, a creeper by profession and practice, this readily identified species, in its striped suit of black and white, may be observed in any bit of eastern woodland. Here it flits from tree to tree or climbs over the trunks and branches, scanning every crack and cranny for the insects that constitute its chief food. Though not a lover of open country, it frequently visits the orchard, where it performs its part in the task of keeping insect life within due bounds. It nests on the ground and hides its domicile so skillfully that it is not often found. None of the warblers are noted as songsters, but the black and white creeper, as I like best to call it, emits a series of thin wiry notes which we may call a song by courtesy only. In scrambling over the trunks of trees it finds and devours many long-horned beetles, the parents of the destructive root-borers; it also finds weevils, ants and spiders.

YELLOW WARBLER (Dendroica æstiva and races).

Length, little more than 5 inches. Mostly yellow, breast and belly streaked with reddish brown.

Range: North America, breeding generally throughout its range south to California, New Mexico, Missouri and northern South Carolina; winters in Central and South America.

The "yellow bird," or wild canary, as it is sometimes called, is one of the commonest of the warbler tribe, and ranges over a vast extent of territory, being found here and there from ocean to ocean. Unlike some of its relatives, it prefers open thickets, especially of willows, to thick woodland, and often builds its pretty nest by the roadside or in garden shrubbery. Though not an expert musician, the yellow warbler sings early and often, and in zeal makes up what it lacks in quality of voice. Because its nest is easily found by the initiated, this warbler is often victimized by the infamous cowbird and is forced to bring up one, or even two, young cowbirds in place of its own rightful progeny. It is pleasant to be able to record the fact that sometimes the clever warbler knows enough,—how it knows it is another matter,—to evade the unwelcome responsibilities thus thrust upon it, and builds a platform over the alien egg and then continues its domestic affairs as originally planned. Indeed cases are on record when two cowbirds' eggs have been found in a nest, each covered up by a separate layer of nest material. If this is not intelligence of a high order, how else can we characterize it? The food of this warbler consists almost exclusively of harmful insects, including the black olive scale.

(See Biol. Surv. Bul. 17, p. 20 et seq.; also Bul. 29.)

AUDUBON'S WARBLER (Dendroica auduboni).

Length, about 5 inches. Much like the yellow-rump but with yellow crown and throat patch.

Range: Breeds from central British Columbia, Alberta and southwestern Saskatchewan to our southern border, east to South Dakota and Nebraska; winters from California and Texas, south to Guatemala.

America is particularly favored by the presence of the beautiful wood warbler family, the members of which are excelled by few birds in symmetry of form, pleasing coloration and graceful motions. They are also of highly beneficial habits. No member of the wood warbler family is more characteristic of the group than this beautiful bird. In voice, coloration, and habits it is almost the counterpart of the yellow-rump of the eastern states, for which indeed it might easily be mistaken were it not for its yellow throat, the corresponding area in the yellow-rump being white. It summers in the mountains and shows off to advantage against the dark foliage of the pines. It seems to have little fear of man and in winter frequents orchards, gardens, and dooryards. Wherever it may be it keeps up an incessant hunt for its insect food, in the pursuit of which, like many others of its family, it sometimes essays the role of flycatcher, being very expert and nimble on the wing. This warbler also devours large numbers of ants, flies, scale and plant lice, and various noxious beetles and bugs.

(See Biol. Surv. Bul. 30, pp. 43-46).

REDSTART (Setophaga ruticilla).

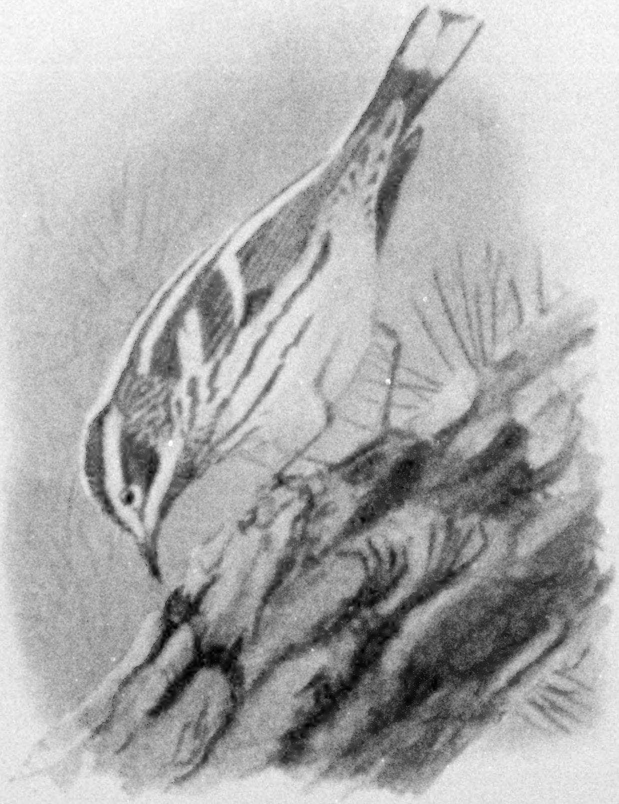
Length, nearly $5\frac{1}{2}$ inches. To be distinguished from other warblers by its coloration and its motions. (See below.)

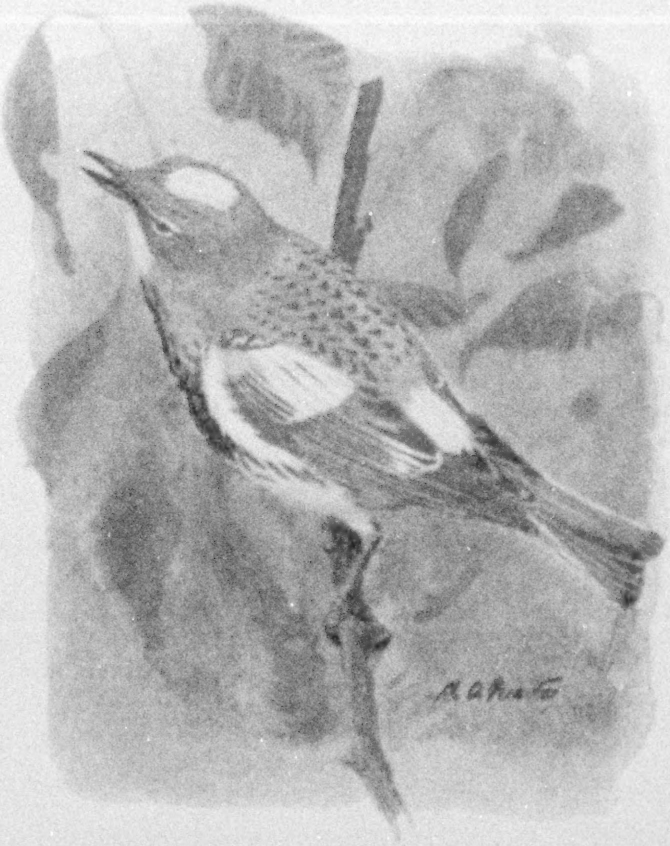
Range: Breeds from central British Columbia and eastern Canada to Washington, Utah, Colorado, Oklahoma and North Carolina; winters in the West Indies and from Mexico to Ecuador.

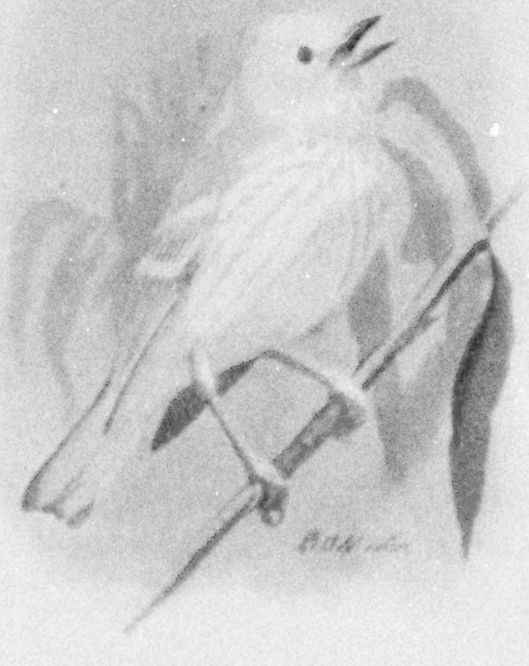
Its beauty of form and plumage and its graceful motions place this dainty bird at the head of our list of wood warblers—a place of distinction indeed. The bird appears to be the incarnation of animated motion and fairly dances its way through the forest. Spanish imagination has coined a suggestive and fitting name for the redstart, *candelita*, the little "torch bearer." The full appropriateness of the name appears as the graceful creature flits through the greenery, displaying the salmon-colored body and the bright wing and tail patches. The redstart is not unknown in some parts of the west, but it is essentially a bird of the eastern states, where it is a common inhabitant of open woodland districts. The wood warblers are not our most artful architects, and in this respect the redstart does not depart from the traditions of its kind. While it builds a rather neat and compact structure of strips of bark, plant fibres and the like, placing it in a sapling not far from the ground, the nest is not the thing of beauty one might be led to expect from such a fairy-like creature. Ornamental as the redstart is, it possesses other claims on our gratitude, for it is a most active and untiring hunter of insects, such as spittle insects, tree-hoppers and leaf-hoppers, and both orchard and forest trees are benefited by the unceasing warfare it wages.

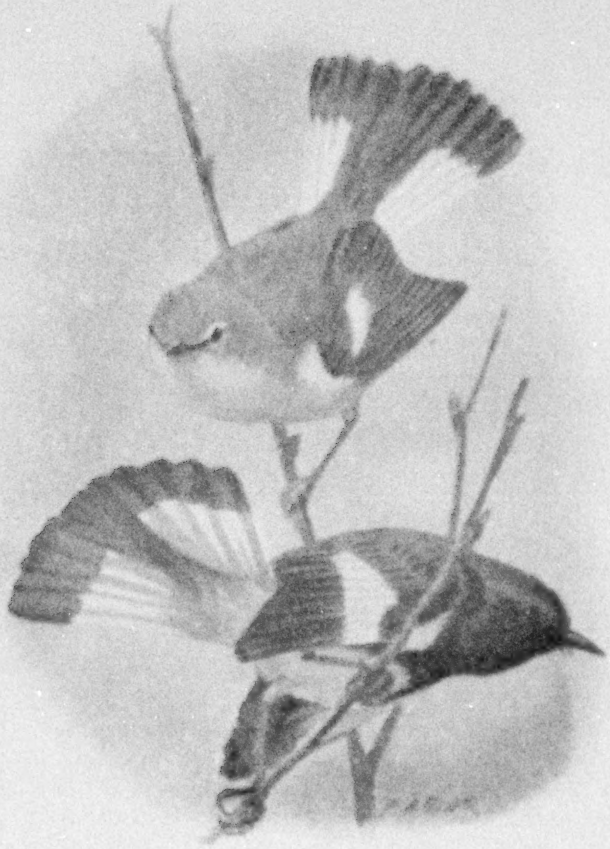
(See Biol. Surv. Bull. 17, p. 20 et seq.)

XUM









Black and White Warbler
Yellow Warbler

Audubon's Warbler
American Redstart
Female, upper; male, lower

INDIGO BUNTING (Passerina cyanea).

Length, about 5½ inches. The male is easily identified by the rich blue color, with black wings and tail. The female is warm brown.

Range: Breeds from eastern North Dakota, central Minnesota, northwestern Michigan, southern Ontario and southern New Brunswick to central Texas, southern Louisiana, central Alabama and central Georgia; winters from southern Mexico to Panama.

The indigo bird is the brightest colored sparrow that visits the north, but one can hardly believe that the sprightly dandy, clad in his rich blue suit, is the mate of the inconspicuous brown bird that seeks assiduously to conceal herself in the leafy cover, as though a bit ashamed of the contrast between her working suit and the holiday garb of her spouse. The indigo is a frequenter of sprout land, of brushy thickets and of open woodland, and the male is fond of singing his cheerful lay from the topmost twig of a tall shrub or tree, as though challenging the world to produce his equal. For such a dainty bird, the nest is a singularly inartistic structure and very carelessly built. It is placed in the crotch of some low leafy bush and is not at all difficult to find.

The fine feathers of the male are not the only claim of the indigo bird to our interest. Its food consists largely of weed seed, but it eats many insects, including a goodly proportion of grasshoppers and caterpillars.

WHITE-THROATED SPARROW (Zonotrichia albicollis).

Length, about 6¾ inches. The white throat and yellow before the eye are its distinguishing colors.

Range: Over most of eastern North America. Breeds in much of Canada south to southern Montana, central Minnesota, central Wisconsin and in the mountains of northern Pennsylvania, New York and Massachusetts; winters south of the Ohio.

This is one of the bird lovers' favorites, as well it may be. Its beautifully variegated plumage, its jaunty ways, its familiarity and its sweet and plaintive whistle all combine to commend the bird to our interest. In the fall it comes to us in large flocks associated with other species, especially juncos and various other sparrows. The " peabody bird " is singularly prodigal of its sweet song, and the young white-throats begin to try their voices in the fall as if practicing for the more exacting demands of spring. When a number join in the fall chorus the result is singularly sweet and inspiring. Many a camper in the north woods, as he lies in his blanket under the stars, pays tribute to the sweet voices of this songster, as it is borne on the midnight air to his ears from some leafy retreat.

The food habits of this sparrow give it a place among the farmers' friends. It is a great destroyer of weed seed and is especially fond of those of ragweed and bindweed. In the cotton belt, where many white-throats winter, it includes among its insect food the boll weevil.

LAZULI BUNTING (Passerina amœna).

Length, from 5¼ to 5½ inches. Male blue above, breast brownish; wing bars white. Female brownish.

Range: Breeds from southern British Columbia, southern Alberta, southeastern Saskatchewan and western North Dakota to southern California and southwestern Texas; winters in Mexico.

The lazuli finch is a near relative of the indigo bunting and the nonpareil, and its habits are in a general way very similar. There is the same disparity between the dress of the sexes, the color of the female being comparatively dull and homely. The male, however, is a gay plumaged dandy in his suit of turquoise blue, and is likely to surprise the stranger who meets him for the first time, since his colors suggest a tropical setting and are somewhat out of keeping with his surroundings. Notwithstanding his fine feathers, he is not so fond of displaying himself as is his cousin, the indigo bird, but seems to think that the cover of brush and chapparral is essential to his safety. The lazuli finch is a cheerful singer, and its song may be heard at frequent intervals. This song is vivacious and pleasing and the Easterner who hears it for the first time will have no difficulty in guessing at the identity of the chorister, from the resemblance of his lay to the ditty of the indigo bird.

We know comparatively little about the food habits of this finch. It is known, however, that it is a confirmed seed eater and also devours many insects.

SLATE-COLORED JUNCO (Junco hyemalis).

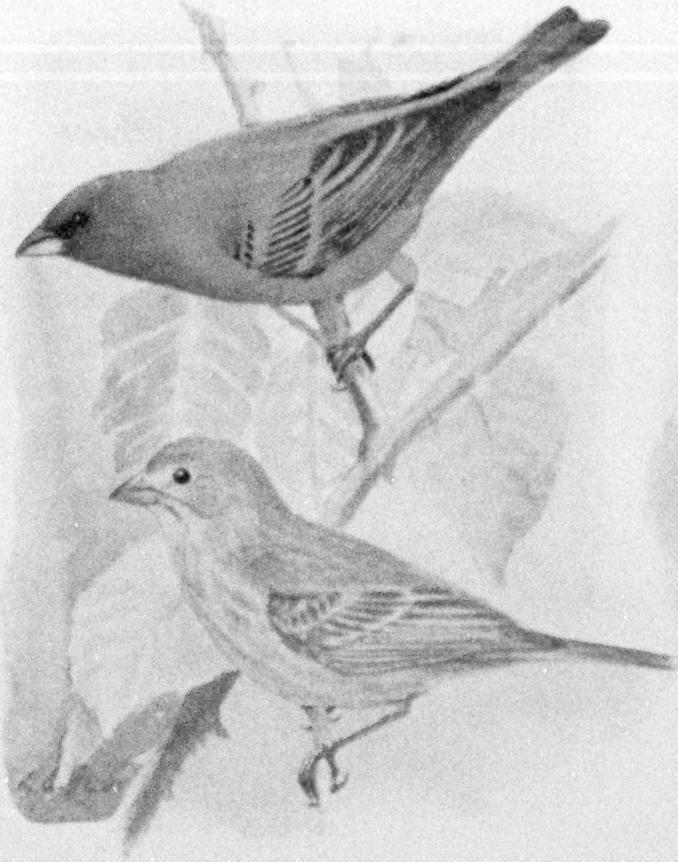
Length, about 6¼ inches. Prevailing color grayish slate, belly white; outer tail feathers tipped with white.

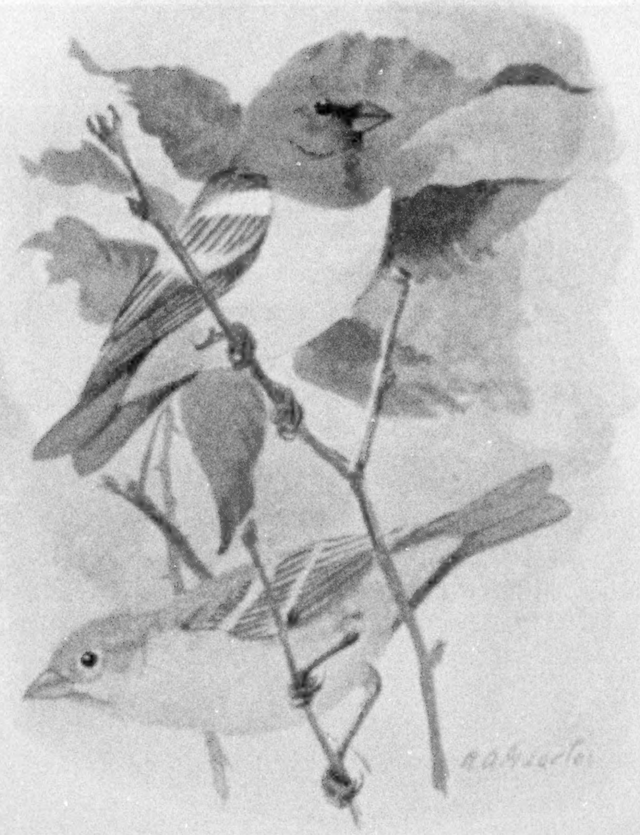
Range: Breeds in much of Alaska and Canada and in the mountains of New York, Pennsylvania and Massachusetts, while a nearly related form (the Carolina Junco) breeds in the southern Alleghenies; winters throughout the eastern states to the Gulf.

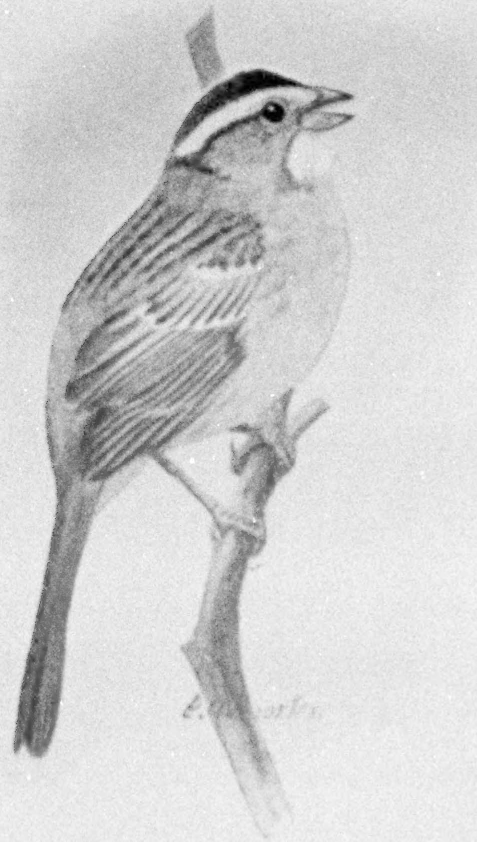
Only one junco inhabits the eastern United States, but several species live in the west. All of the members of the group resemble each other in a general way and all have similar habits. Most of us know the junco only in the fall and when, after having summered in the mountains of the more northern districts, the birds gather in large flocks and forsake high altitudes for more congenial surroundings. The junco associates with other sparrows, usually far outnumbering them, but its slate-colored plumage and white tail feathers reveal its presence unmistakably. Its familiar "tsip," may be easily recognized among the medley of notes, but its low sweet song is to be heard at its best only in its alpine home. Nevertheless, as the late migrants shape their course for the northern woods, it is not uncommon to hear the males of a flock burst into song, as if they really could not be content to remain silent any longer. When snow is on the ground the juncos are often hard pushed for food and on such occasions a flock will readily respond to an invitation to visit the dooryard and dine on table crumbs or small seeds of any kind.

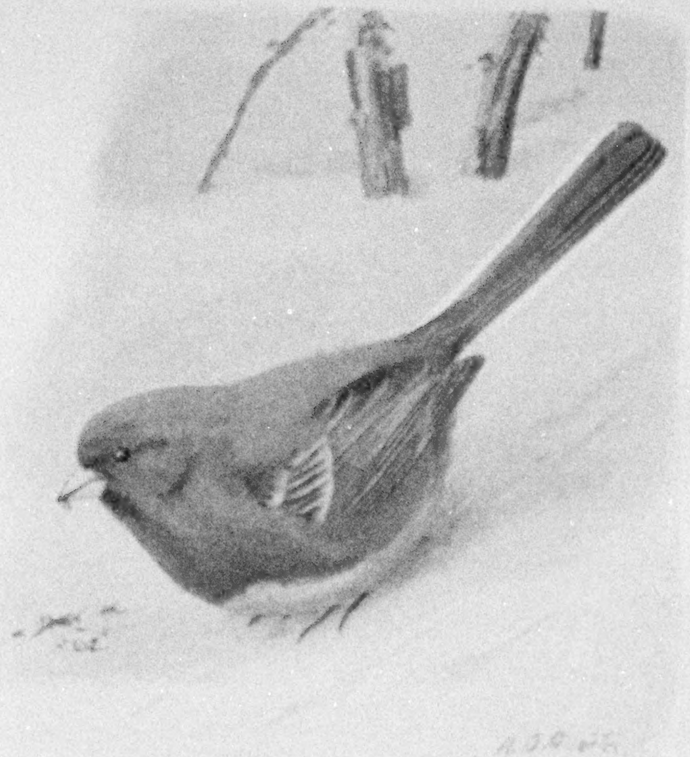
The junco is one of our most persistent grass and weed seed eaters and in winter and spring seeds constitute much the greater part of its fare. Taking the year around about one-fourth of its food consists of insects, including leaf beetles, weevils, caterpillars, grasshoppers and many others.

(See Biol. Surv. Bul. 15, pp. 80-82.)









Indigo Bunting
Male, upper; female, lower
White-throated Sparrow

Lazuli Bunting
Male, upper; female, lower
Slate-colored Junco

BLACK FLYCATCHER; PHAINOPEPLA (Phainopepla nitens).

Length, about 7½ inches. The glossy black color and marked crest of the male and the brownish gray of the female, also crested, distinguish this species.

Range: Breeds from central California, Nevada, Utah, and southwestern Texas southward; winters from southern California southward.

Though a distant relative of the cedar bird, the phainopepla differs markedly from that species both in appearance and habits. It is known to few, for it lives chiefly in the desert country of the southwest, though it is not wholly a stranger in the parks and gardens of that region. When flying the white wing-patch becomes conspicuous and distinguishes the bird from all others. In the fall it is not unusual to find it in loose flocks the members of which are drawn temporarily together, perhaps by the abundance of some favorite food. Like the cedar bird, it is essentially a berry eater, and in California sometimes makes free of the cherry crop. Its chief dependence, however, is the mistletoe, the mucilaginous berries of which delight it, as also do those of the juniper and pepper. Its partiality for mistletoe is probably the bird's worst trait, as it distributes the seeds of this pernicious parasite to the detriment of many fine oaks and sycamores. It eats many insects, principally ants, and has the habit of perching on a tall shrub, from which it sallies forth after flying insects, thus simulating a flycatcher. It is this habit which has given the bird its common name. The phainopepla has a variety of call notes and a very pleasant song.

YELLOW-THROATED VIREO (Lanivireo flavifrons).

Length, about 6 inches. Its green upper parts and bright yellow throat and upper breast are its identification marks.

Range: Breeds from southern Canada south to central Texas, central Louisiana and central Florida; winters from southern Mexico through Central America.

By no means so common as the red-eye, the yellow-throat inhabits the same kind of woodland tracts and like it may often be seen, and still oftener heard, in the trees that shade the village or even the city streets. It is, however, much less common in such places since the advent of the English sparrow, having been driven away by that little pest. Its song is much like that of the red-eye, yet it has a rich throaty quality quite foreign to the notes of that tireless songster and far superior to them. Neither this, nor indeed any of the vireos, ever seem to be in a hurry. They move quietly through the leafy covert, scanning the most likely lurking places for insects, pausing now and then to sing in a meditative manner, then renewing their quest. All of which is as different as possible from the busy, nervous movements of the wood warblers, that seem ever in haste as though time were much too precious to waste.

The food of the yellow-throat consists of a large variety of insects, including caterpillars, moths and beetles, and also those well-known pests, flies and mosquitoes. It also eats the plum curculio.

RED-EYED VIREO (Vireosylva olivacea).

Length, about 6¼ inches. The slaty gray crown enclosed by narrow black lines serves to identify this vireo.

Range: Breeds from central Canada south to southeastern Washington, southern Montana, eastern Wyoming, eastern Colorado, western Texas, and central Florida; winters in South America.

The red-eye is one of the commonest not only of our vireos but also of all our small birds, and inhabits every suitable piece of woodland throughout its territory. Its notes may be frequently heard coming from the village shade trees; city parks and streets also know it. Its most notable trait is its habit of singing almost continuously as it moves slowly through the branches, pausing now and then to pick up a caterpillar or other insect. In woods where these vireos are common its voice may be heard all the livelong day, even during the noon hours when most birds are silently resting. The nest, suspended in a V-shaped fork, is a beautiful specimen of avian architecture, and so indifferent is the bird to its location that the nest of no other bird is so frequently seen by the chance passerby.

Though fond of mulberries and sassafras berries, the red-eye eats insects by preference, and spends most of its time gleaning the branches for plant lice scales and caterpillars of various kinds. It eats such harmful beetles as the long-horned borers and weevils. I once saw a red-eye with a full grown luna moth in its bill. After vigorously beating the helpless moth on a limb to get rid of the wings the bird succeeded in reducing the enormous body to a formless mass and eventually swallowed it.

(See Bull. 17, p. 23.)

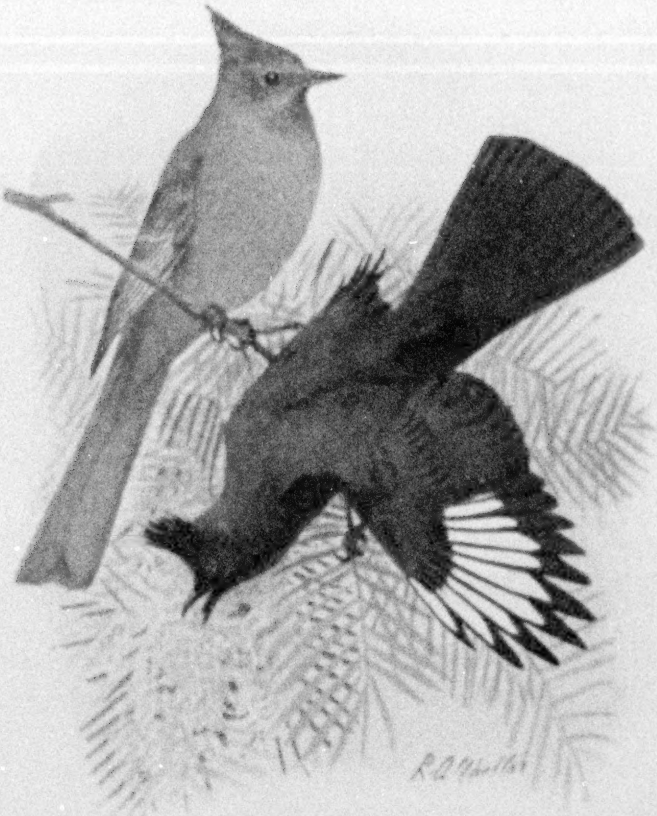
LARK SPARROW (Chondestes grammacus and sub-species).

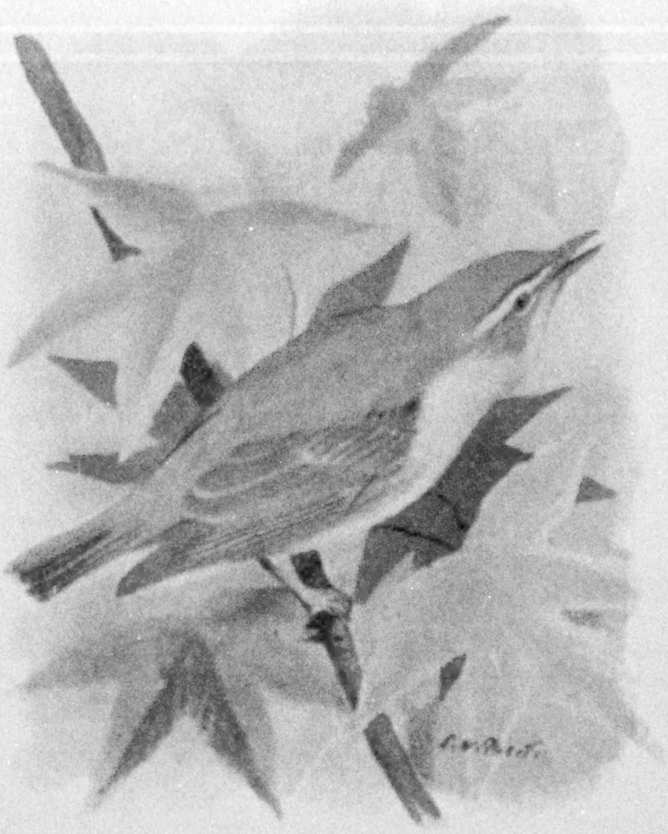
Length, about 6¼ inches. The variegated head markings and white outer tail feathers distinguish this species.

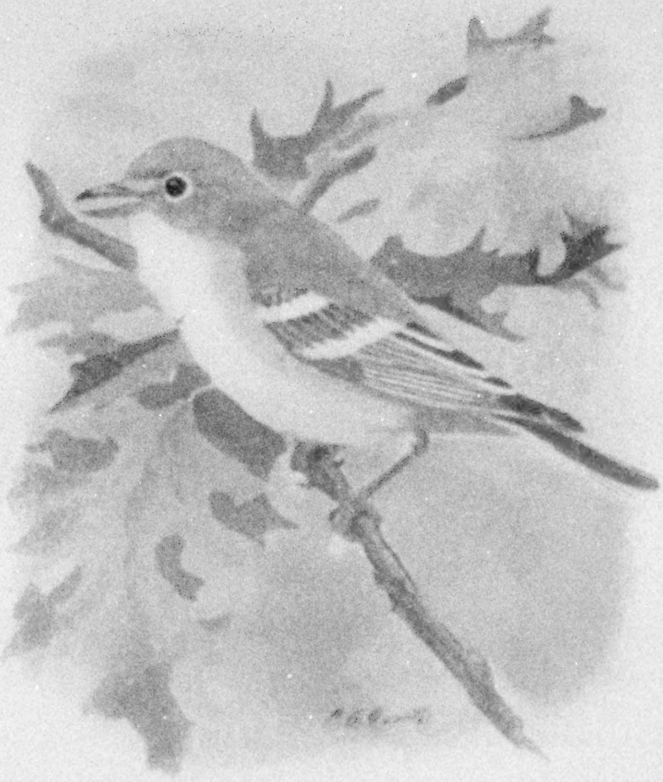
Range: From western Pennsylvania and western Maryland and the Mississippi valley westward; and from southern British Columbia and southern Saskatchewan to central Alabama, northern Louisiana, Texas and south into Mexico; winters from northern California, southern Texas and southern Mississippi to Guatemala.

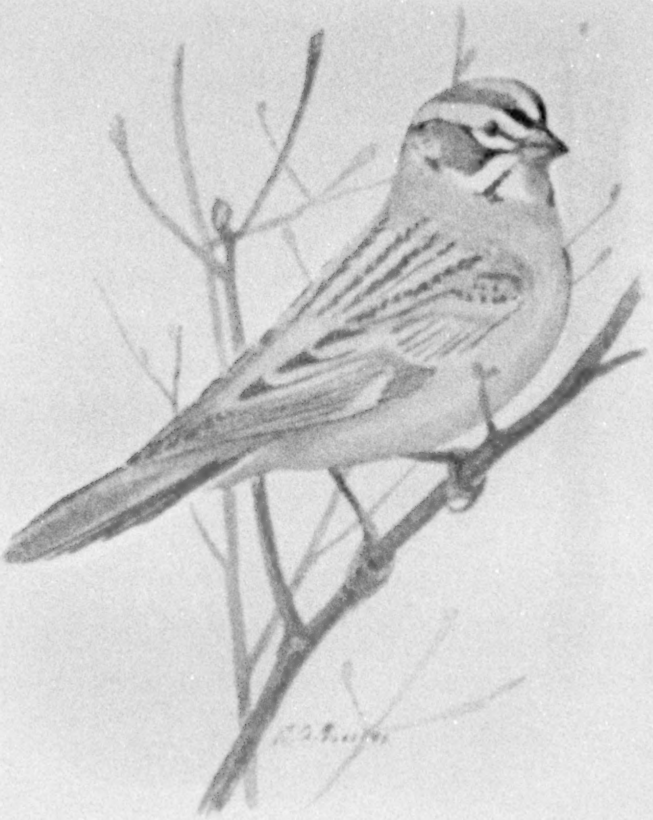
With some of the habits of the grass finch and, like that species, having the tail feathers tipped with white, the lark sparrow yet possesses distinctive traits of its own and after a little scrutiny can be mistaken for no other species. Its peculiar head markings have suggested the local western name of "snake bird," although the reason is not quite obvious. The lark finch is usually very abundant where found at all, and inhabits the open country, prairie, plain, and desert. It is often to be seen running along the dusty roads or perching on the roadside bushes and fences. It is a really fine songster and the possession of a musical voice has led to its capture and sale as a cage bird.

It has peculiar claims on the interest of the western farmer since it is to be classed in the front rank of sparrows as a destroyer of grasshoppers. These harmful insects and others constitute about a third of its food for the year, while weed seeds of great variety form the other two thirds.









Black Flycatcher or Phainopepla
Female, upper; male, lower
Yellow-throated Vireo

Red-eyed Vireo
Lark Sparrow

XUM

MARYLAND YELLOW-THROAT (Geothlypis trichas and variety).

Length, about 5¼ inches. Mostly green above, yellow below. Distinguished from other warblers by broad black band across forehead, bordered narrowly with white.

Range: Breeds from southern Canada to southern California, Texas and Florida; winters from the southern United States to Costa Rica.

This little warbler is common throughout the eastern and southern states, frequenting thickets and low bushes on swampy ground. He is not a tree lover, but spends most of his time on or very near the ground, where he hunts assiduously for caterpillars, beetles and various other small insects. Among the pests that he devours are the western cucumber beetle and the black olive scale. He has a cheery song of which he is not a bit ashamed and, when one happens to be near the particular thicket a pair of yellow-throats have chosen for their own, one has not long to wait for vocal proof that the male, at least, is at home. The yellow-throat has the bump of curiosity well developed and if you desire a close acquaintance with a pair you have only to "squeak" a few times, when you will have the pleasure of seeing at least one of the couple venture out from the retreat far enough to make sure of the character of the visitor.

YELLOW-BREASTED CHAT (Icteria virens and sub-species).

Length, about 7½ inches. Its size, olive-green upper parts and bright yellow throat, breast, and upper belly distinguish this bird at a glance.

Range: Breeds from British Columbia, Montana, Wisconsin, Ontario and southern New England south to the Gulf States and Mexico; winters from Mexico to Costa Rica.

The chat is one of our largest and most notable warblers. It is a frequenter of brushy thickets and swampy new growth and, while not averse to showing itself, relies more upon its voice to announce its presence than upon its green and yellow plumage. Not infrequently the chat sings during the night. The song, for song we must call it, is an odd jumble of chucks and whistles which is likely to bring to mind the quip current in the West, "don't shoot the musician; he is doing his best;" in this same charitable spirit we must accept the song of the chat at the bird's own valuation, which, we may be sure, is not low. Its nest is a rather bulky structure of grasses, leaves and strips of bark and is often so conspicuously placed in a low bush as to cause one to wonder how it ever escapes the notice of marauders fond of birds' eggs and nestlings.

The chat does no harm to agricultural interests but on the contrary, like most of the warbler family, lives largely on insects, and among them are many weevils, including the alfalfa weevil, and the boll weevil so destructive to cotton.

(See Biol. Surv. Bul. 17, p. 18 et seq.; also Circular 64, p. 5.)

OVEN-BIRD (Seiurus aurocapillus).

Length, a little over 6 inches. Above mostly olive green; below white, breast and sides streaked with black.

Range: Breeds from southern Mackenzie, Ontario, southern Labrador and Newfoundland south to Wyoming, Kansas, southern Missouri, Ohio Valley and Virginia; also in mountains of Georgia and South Carolina; winters in southern Florida, southern Louisiana, Bahamas, West Indies, and southern Mexico to Colombia.

The oven-bird is one of our best known birds and one the woodland stroller is sure to get acquainted with, whether he will or no, so common is it and so generally distributed. In moments of ecstacy it has a flight song which has been highly extolled, but this is only for the initiated, its insistent repetition of "teacher, teacher, teacher," as Burroughs happily phases it, is all the bird vouchsafes for the ears of ordinary mortals. Its curious domed-over grass nest is placed on the ground and is not hard to find. The food of the oven-bird does not differ greatly from that of other warblers, notwithstanding the fact that the bird is strictly terrestrial in habits. It consists almost exclusively of insects, including ants, beetles, moths, span worms and other caterpillars, with a few spiders, millepods and weevils.

(See Biol. Surv. Bul. 17; also yearbook for 1900, p. 416.)

CEDAR WAXWING (Bombycilla cedrorum).

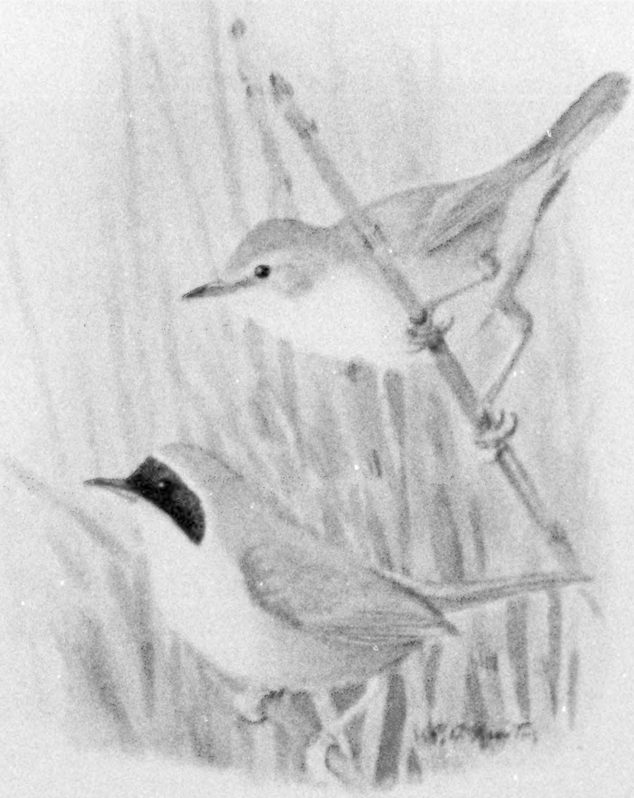
Length, about 7¼ inches. Known from every other American bird, except its larger cousin, the Bohemian waxwing, by its crest, grayish brown upper parts, yellow tail band and sealing wax-like tips to secondaries and, sometimes, to tail feathers.

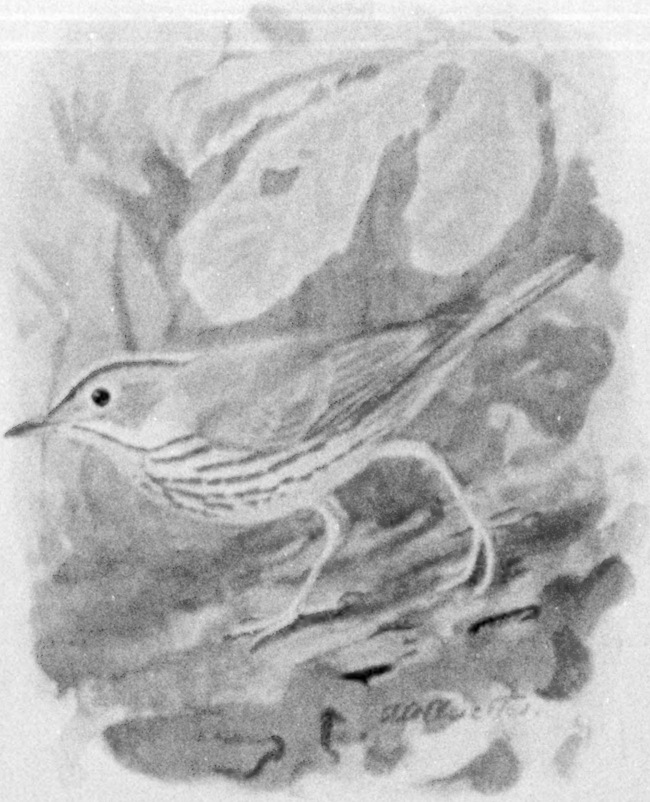
Range: Breeds from central British Columbia, Alberta, southern Keewatin, northern Ontario and northwestern Quebec south to southern Oregon, northern New Mexico, Kansas, northern Arkansas, and North Carolina; winters over most of United States and southward to Mexico and Panama.

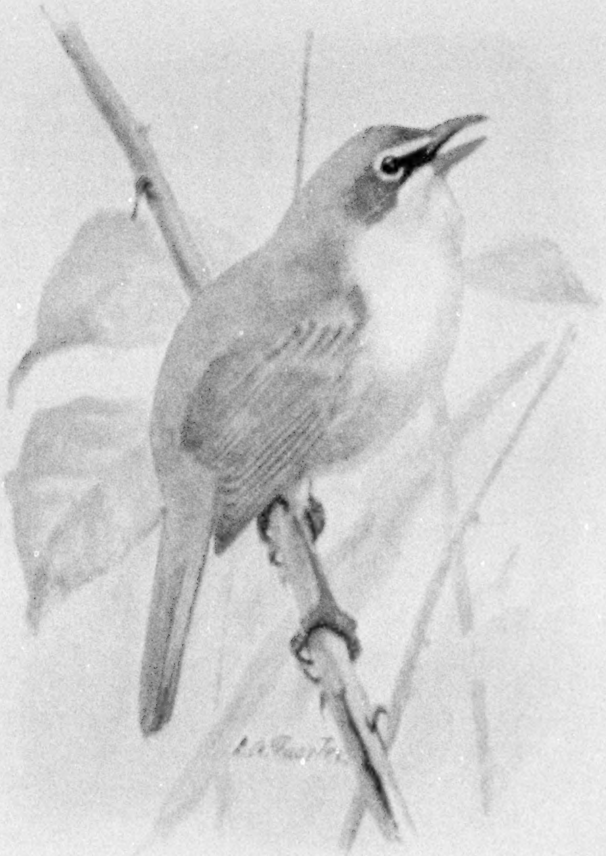
In clothing the cedar bird, Mother Nature essayed her very best and reached the limit of quiet elegance. As if aware of the distinction conferred by its smooth delicately tinted plumage, the waxwing has the air of a well-bred aristocrat, and comports itself with a dignity that is very impressive. Why this beautiful creature should be denied a voice is a mystery but, with the exception of the faintest kind of a whistle and a few low notes, seldom heard, the bird is silent. But its beauty and the good it does should insure it careful protection.

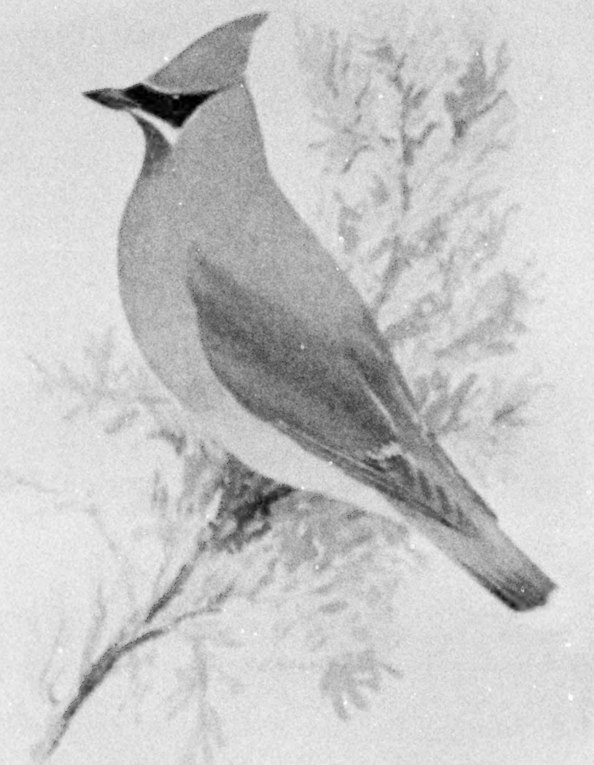
Except during the nesting season, which is very late, the bird is a wanderer, moving about the country in flocks and remaining a shorter or longer time in a given locality according to the abundance of food. The waxwing is a berry eater and its local name of "cherry bird" indicates that it by no means disdains cultivated varieties. Fortunately the bulk of the fruit it takes consists of wild species, especially in winter, when cedar berries are greedily devoured. In the west it includes in its bill of fare mulberries and pepper berries. While insects constitute only a comparatively small percentage of its diet, those eaten include some very destructive species such as scales and the dreaded elm beetle.

(See Farmers' Bul. 54 (rev.), pp. 38-39.)









Maryland Yellow-throat
Female, upper; male, lower
Yellow-breasted Chat

Oven-bird
Cedar Waxwing

TOWHEE (Pipilo erythrophthalmus).

Length, about 8¼ inches. Male mostly black, belly white. Female brown. Outer tail feathers white tipped.

Range: Breeds in the United States from Saskatchewan and southeastern Canada south to Central Kansas and northern Georgia; winters from southeastern Nebraska and the Ohio and Potomac southward.

The towhee is a frequenter of second-growth and of scrub, and when the visitor enters such precincts he is pretty sure to hear the challenging cry, "chewink," and to catch sight of the bird as it hurriedly dashes into some brushy thicket as if in mortal terror. The flight is hurried, jerky and heavy, as though the bird was accustomed to use its wings only in emergencies. This is not far from being the case, as the towhee sticks close to mother earth and uses its great strength and long claws to advantage in making the leaves and rubbish fly in its vigorous efforts to uncover the seeds and insects upon which it relies for food. The towhee thus literally scratches for a living as no other of our birds does, except possibly the brown thrush, and the lazy man may well pass by the industrious ant and go to the towhee for inspiration. No one waxes enthusiastic over its musical ability, but the song is given with such right good will that it is sure to satisfy the hearer as, no doubt, it does the bird himself. Seton interprets it to a nicety with the phrase "chuck-burr, pill-a-will-a-will-a." The towhee includes in its bill of fare beetles and their larvæ, ants, moths, caterpillars, grasshoppers and flies, and also in Texas the boll weevil. Wild fruit and berries complete the list.

ORCHARD ORIOLE (Icterus spurius).

Length, about 7¼ inches. Our only oriole with black and chestnut markings. Female grayish olive green.

Range; Confined to eastern North America. Breeds from North Dakota, Minnesota, Wisconsin, Michigan, southern Ontario, central New York and Massachusetts south to northern Florida, the Gulf Coast and southern Mexico, west to central Nebraska and western Kansas; winters from southern Mexico to northern Colombia.

Though clad in modest garb (for an oriole) and in no respect a rival of the Baltimore, the orchard oriole has merits of his own. As his name implies, he is a lover of orchards, and I have always associated him with the glory of apple orchards in full bloom and with the delicious perfume with which the air is heavy. Amidst such surroundings, the black and chestnut livery of the orchard oriole marks him as one of the princes of our bird world. Gardens and parks also know him well, and he is not averse to swinging his nest from the trees that shade the farmer's house. His nest betrays his connection with the family of weavers, but his skill does not equal that of the Baltimore and he is content with a smaller pensile basket made chiefly of grasses. His song, like his dress, is modest, but it is exceedingly sweet, and one who hears it is sure to pause in his walk and wish that it were longer and given more frequently.

The orchard oriole is chiefly insectivorous, as indeed are all of our species.

CALIFORNIA BROWN TOWHEE (Pipilo crissalis and varieties).

Length, about 9 inches. The long tail and brown plumage with white belly distinguish these ground- and thicket-loving birds.

Range: Southwestern Oregon, through California to northern Lower California.

The brown towhees, of which the California form is a good type, are characteristic of the brushy canyons of the far west, where they skulk and hide among the shrubbery and cactus much as do the common eastern towhees. Their powers of wing are not great and their long tails and heavy bodies render their flight awkward in the extreme. On the ground, however, they run with great ease and speed. In California brown towhees are common in the parks and gardens, and in every way are very much more familiar than the related towhee of the east. Like its eastern cousin, it is much addicted to scratching among leaves and rubbish, for which work its stout legs and claws are particularly adapted. The thin "tchip," which is the call note, seems out of all proportion coming from such a stout, vigorous body. The birds of this group are not fine songsters, but their simple ditties are pleasant to hear in the waste places where they are generally found.

The brown towhee is much more of a vegetarian than an insect eater, and in California Professor Beal found that 85 per cent. of its yearly food consists of fruit, grain and weed seeds.

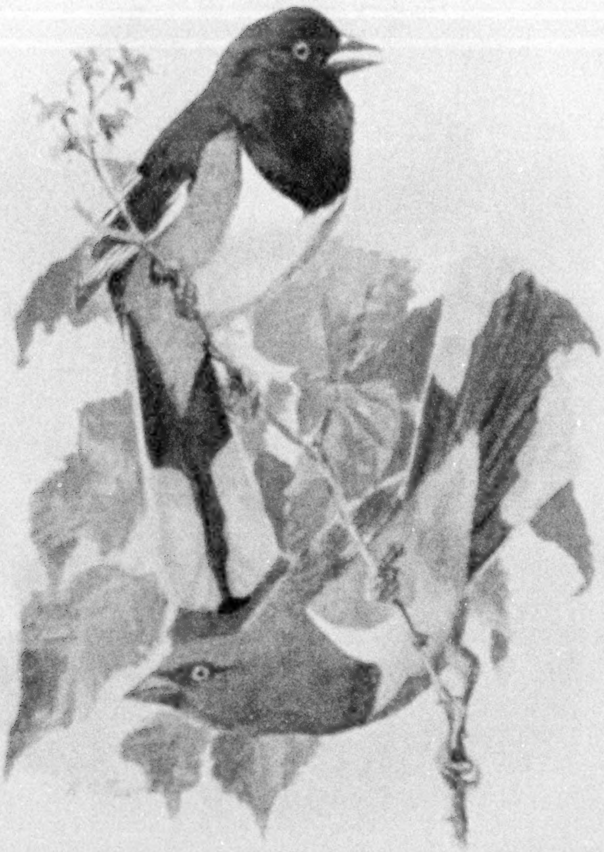
BALTIMORE ORIOLE (Icterus galbula).

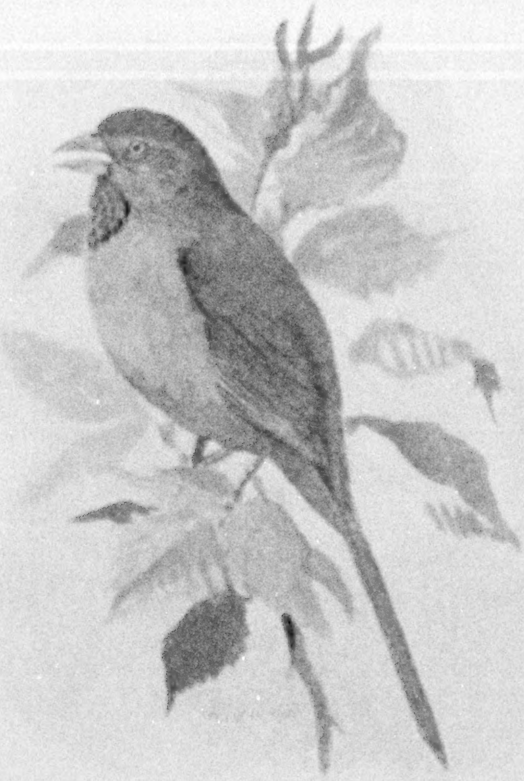
Length, about 7½ inches. The combination of black and orange marks this bird from its fellows.

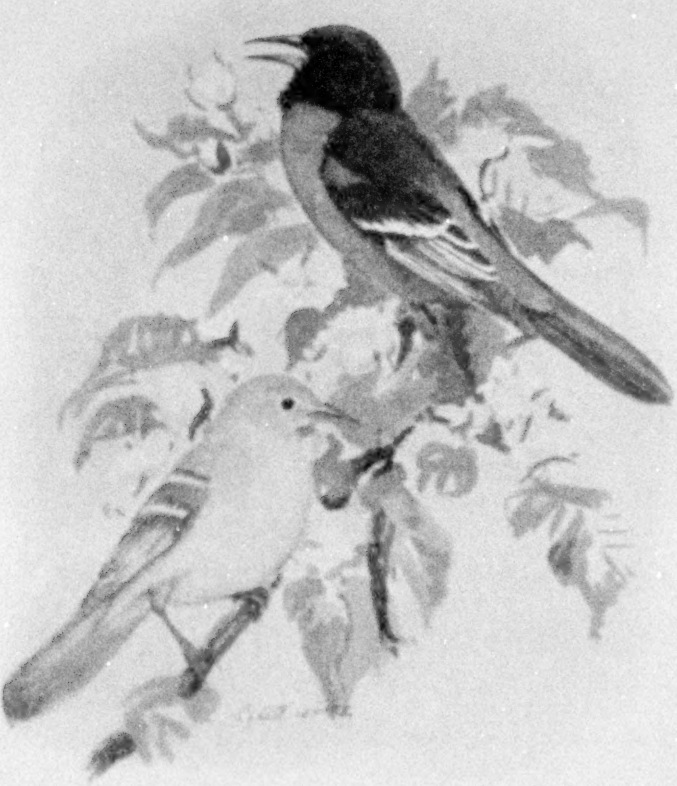
Range: Breeds from central Saskatchewan and the southeastern provinces of Canada south to northern Texas, Louisiana and northern Georgia, west to Montana, Wyoming and eastern Colorado; winters from southern Mexico to Colombia.

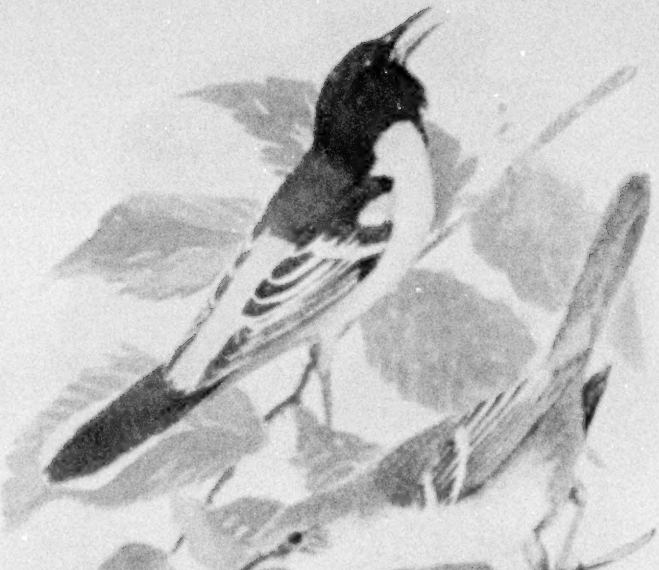
Lord Baltimore was signally honored when one of our finest birds was christened with his name because it chanced to carry the family colors, black and yellow. Orioles are a tropical group and the luxuriant tropical forests are bright with the gleaming colors of many species of these beautiful birds. Only a few have found their way into the temperate zone, but not one of the tropical species is garbed in more tasteful dress than this exotic which has adopted the elms and sycamores of the temperate zone for its summer home. When chill November winds have stripped our shade trees of their foliage then are revealed the long, pendant nests, wrought with so much skill and patience by Madame Oriole, and we begin to realize how many of these birds summer with us. Suitable material for the oriole nest is none too easily found, and the weaver is not so fastidious that she will not accept strings and yarn of any color which are hung out for her convenience; so that at the end of the oriole season the bird lover who is willing to co-operate with a pair of Nature's weavers may fall heir to a nest made to order, so to speak.

The oriole is as useful as it is tuneful and ornamental. Caterpillars constitute the largest item of its fare, including many not touched by other birds. It eats also beetles, bugs, ants, grasshoppers and spiders. Particular mention must be made of the boll weevil, of which the oriole is a determined foe. The small amount of fruit taken by the oriole, including cherries, is insignificant when compared with the long list of harmful insects it destroys.









TOWHEE OR CHEWINK
Male, upper; female, lower
ORCHARD ORIOLE
Male, upper; female, lower

CALIFORNIA BROWN TOWHEE
BALTIMORE ORIOLE
Male, upper; female, lower

MAGPIE (Pica pica hudsonia).

Length, from about 18 to 21 inches. The black head and body and the white belly, white wing patches, and long tail are distinguishing features. The yellow-billed magpie is smaller with a yellow bill.

Range: A characteristic western species. Breeds from Aleutian Islands and Alaska, central Alberta, southern Saskatchewan and Winnipeg Lake south to northern Arizona and New Mexico, and from the Cascades and Sierra to western North Dakota and western Texas; resident.

There are two species of magpies, the yellow-billed being confined to California, where it is very local. In general the habits of the two are similar. "Maggie," as this bird is familiarly known in the west, possesses dual traits. He is beautiful of plumage and adds much to the interest of the landscape as he flies from field to field, his long tail extending behind like a rudder.

Of eminently sociable disposition, this bird is rarely seen alone. He prefers flocks of family size to 50 and upwards. In more ways than one the magpie is like the crow and his sagacity has developed along much the same lines. In most localities he is suspicious and wary, as he has good cause to be, for he is not a favorite with either farmer or ranchman. He is eminently carnivorous, a carrion feeder by preference, an insect eater by necessity, and he performs good service in the latter role. He eats also many wild fruits and berries, but he is an incorrigible thief and well he knows his way to the poultry yard. No sound is sweeter in "Maggie's" ears than the cackle of the exultant hen that has just laid an egg, and the hen house must be well protected that keeps him from his plunder. Perhaps his worst trait, however, is his fondness for the eggs and nestlings of small birds.

PHŒBE (Sayornis phœbe).

Length, about 7 inches. Distinguishing marks are the dusky brown color, dark brown cap and white margined outer tail feathers.

Range: Lives mainly in the east. Breeds from about middle Canada south to northeastern New Mexico, central Texas, northern Mississippi and mountains of Georgia; winters from south of latitude 37° to southern Mexico.

Few of our birds have won a more secure place in our hearts than plain little phœbe, who has no pretentions to beauty of plumage or excellence of song. For this its confiding disposition and trusting ways are responsible, and many a farmer listens for its familiar voice in early spring and welcomes it back to its accustomed haunts under the old barn. Originally building its nest on the face of cliffs, the phœbe soon forsook the wilds for man's neighborhood, and year after year apparently the same pair returns to the identical rafter in the barn, the shelter of the porch, or the same nook under the foot bridge, which they have claimed for their own for many seasons. The insistent call of "phœbe—phœbe" is as familiar as the pipe of the robin.

The phœbe has further claims to the favor of man since it is one of the most useful of birds, living almost wholly on insects, among which are many noxious kinds, as May beetles, click beetles, and several species of weevils, including the boll weevil and the strawberry weevil. As if reluctant to leave their northern home, many phœbes remain with us till late fall, and individuals may be seen lingering in sheltered places in the woods long after other flycatchers have started for the tropics.

BLUE-FRONTED JAY (Cyanocitta stelleri and sub-species).

Length, $11\frac{3}{4}$ to 13 inches. Easily distinguished from its fellows by its high crest, brownish slaty fore-parts, dark blue wings and tail and blue or whitish streaks on forehead.

Range: Resident in western North America from southern Alaska and Montana to Mexico.

The blue-fronted jays, of which the Steller jay may be taken as the type, are common inhabitants of the piny woods of both the Rocky Mountain and the Sierra Nevada States. They are among the handsomest of the family, the beauty of their plumage, their long erectile crests, and their insistent voices compelling the attention of any who invade their retreats. Not being residents of cultivated districts, although they eat grain and small fruits, they do comparatively little damage. On the other hand, they do not do much good, for, although they are insect eaters, insects do not constitute a large part of their food, nor are the kinds they eat very important economically. Probably their most serious fault is a fondness for the eggs and young of small insectivorous birds of which they destroy many in the course of the year. They share this failing with all other members of the family, and bird lovers must deem it a pity that such bold, dashing, handsome birds as the jays should be so destructive to small but useful birds. This habit is all the more to be deplored inasmuch as when unmolested jays readily respond to invitations to be neighborly, and willingly take up their abode near houses, where they never fail to excite admiration and interest.

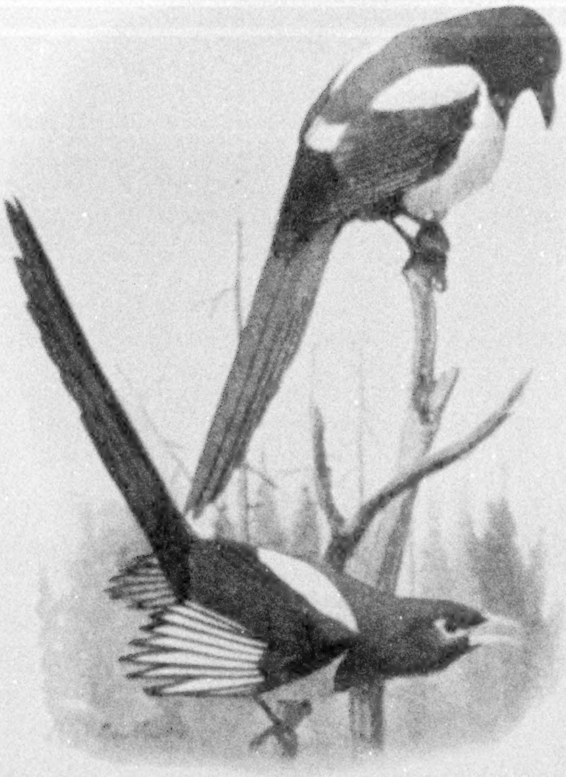
WOOD PEWEE (Myiochanes virens).

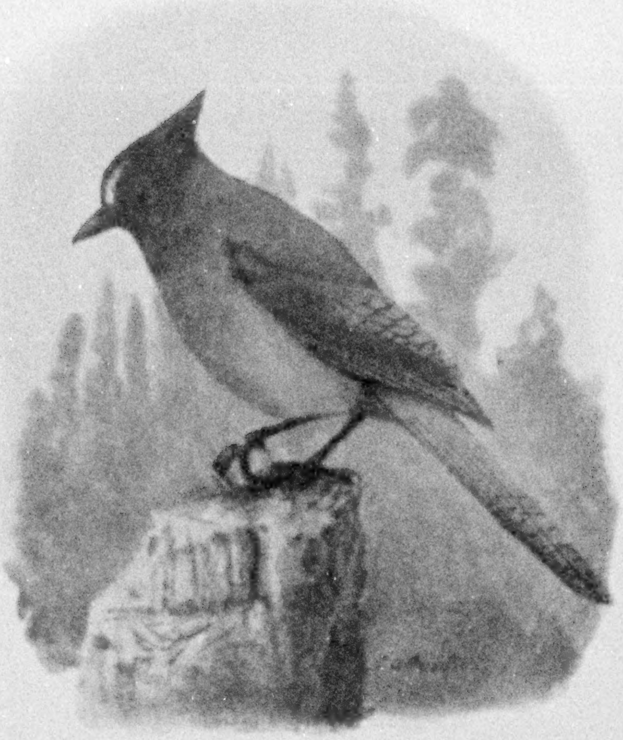
Length, about $6\frac{1}{2}$ inches. Not readily distinguished by color, though darker than most other small flycatchers, and with wing longer than tail.

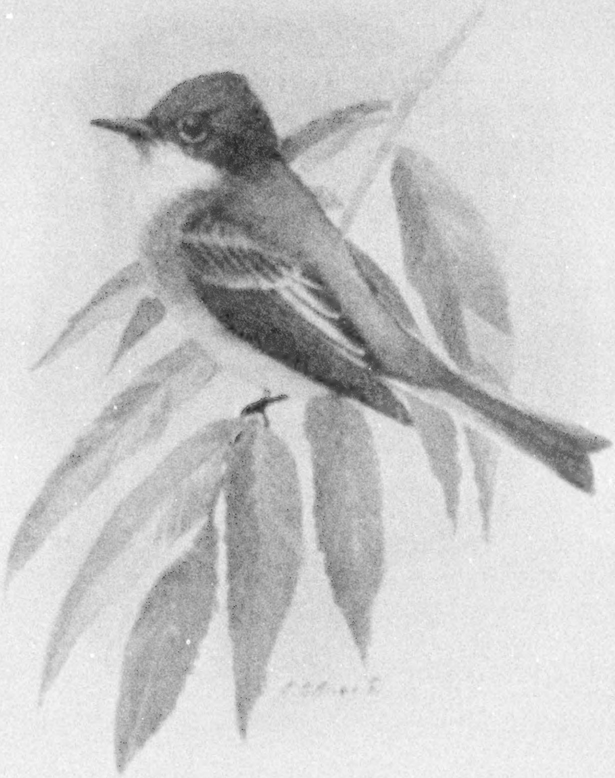
Range: Breeds from Manitoba and southeastern Canada to southern Texas and central Florida; winters in Central and South America.

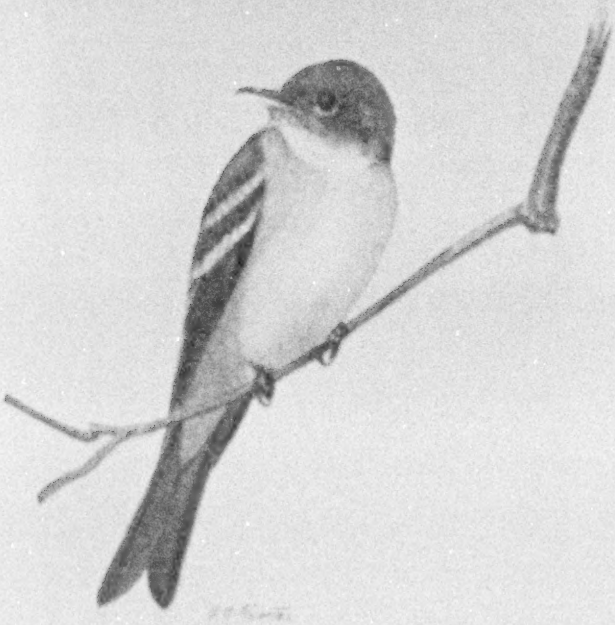
The wood pewee is clad in such modest garb and is of such retiring disposition that, were it not for its voice, it would often be passed unnoticed even by the most observant, especially as its home is in shaded glens or deep woods. Here the wood pewee pursues its vocation with a vigor worthy of all praise, and the snap of its mandibles as they close over some luckless flying insect is often the only sound heard in the depths of the quiet forest. There is little about the habits and make-up of this, or indeed of any of the flycatchers, to suggest great constructive skill, but the nest of the wood pewee is a marvel of taste and ingenuity and, though much larger, suggests the dainty architecture of our hummingbirds. Like their fairy creations the wood pewees' nest is covered with lichens and saddled neatly across a limb.

The food of this flycatcher consists almost exclusively of insects and includes among others crane flies, beetles, dragon flies, ants, grasshoppers, caterpillars and moths of many kinds. It also devours such pests as the clover weevil, the plum curculio, the corn weevil, the rice weevil, and others nearly as harmful, and many flies, including the house fly.









Black-billed Magpie
Yellow-billed Magpie
Phœbe

Blue-fronted Jay
Wood Pewee

RUBY-THROAT (Archilochus colubris).

Length, about 3¾ inches. Needs no description as it is the only hummer living in the eastern states.

Range: Breeds from southeastern Saskatchewan and central Quebec south to Gulf Coast, west to North Dakota, Nebraska, Kansas and central Texas; winters from middle Florida and Louisiana through southern Mexico and Central America to Panama.

Of the five hundred or more species of this strictly American family, the eastern United States is favored by the presence of only one, the ruby-throat, nor is this species as common as might be desired. Compared to the abundance of its kind in the far west it is rare indeed. As if afraid of being too prodigal of her gifts, Nature has denied the hummingbird song, and the harsh squeaks of these tiny sprites are far better adapted to making war than love. Truth is, the hummer has a sharp temper and not only engages in warfare with its own kind but attacks any bird, however large, that ventures to dispute its territorial rights. These are not small, for in its own estimation it is literally "Lord of all it surveys." The male is an inconstant swain and no sooner is the nest made—and in the making he takes no part—and the eggs laid than he departs, leaving the joys and cares of housekeeping to his erstwhile mate. While the nectar of flowers is eaten in large quantities, a creature so vivacious as the hummer could hardly sustain life on diet so thin, and the bird adds to its bill of fare a liberal supply of minute insects and spiders of various sorts.

RUFOUS HUMMINGBIRD (Selasphorus rufus).

Length, from 3¼ to 3¾ inches. The reddish brown body color, red and green gorget, and the notch in tail feathers serve to distinguish this species from our other hummers.

Range: Breeds from the Alaskan coast, east central British Columbia, and southern Alberta south to the mountains of central California, and southern Idaho.

One can but wonder at the hardihood of this little wanderer from the tropics in including in its summer itinerary a journey to distant Alaska. It reaches a latitude of 61°, much farther north than any other of its kind. In favored glades of the forests in the Rocky Mountains and the Sierras during the migration this and other species of hummers are to be seen literally by hundreds. The rufous hummer has temper and courage to match its fiery hues, and spends no small part of its time doing battle with its fellows. The contestants after several fierce rounds fly away not only fit but eager for another fray on the first occasion. In addition to the nectar of flowers, its standard fare, this hummer includes in its diet "honey dew," the sugary secretion of plant lice which is deposited on vegetation. Like all other hummers it eats large numbers of minute insects which it finds inside the flowers. It is interesting to note that hummingbirds discover the flowers they frequent by sight alone and any bit of bright color in the distance is sure to attract their notice, as a bright red handkerchief on a bush or about the neck. More than once I have observed them poising within a few inches of my head evidently endeavoring to ascertain the nature of the red handkerchief I wore.

WHIP-POOR-WILL (Antrostomus vociferus).

Length, about 10 inches. Not to be confused with the nighthawk, which flies by day and has white wing bars, while the whip-poor-will is crepuscular and nocturnal.

Range: Breeds from the Atlantic to the plains, and from Manitoba and the eastern Canadian Provinces south to northern parts of Louisiana, Mississippi and Georgia; winters from South Carolina and the Gulf States to Central America.

This bird of the night, whose day begins with the going down of the sun when the nighthawk's ends, is common throughout the east in open woodlands, on the edges of which it likes to hunt. It dozes away the hours of daylight squatting on the ground among the leaves where its marvelous protective coloration affords it safety. No sooner have the shadows lengthened, however, than it becomes active and its characteristic note resounds through the forest glades. So plaintive is its cry and so mysterious its comings and goings, that in the minds of many its notes are associated with misfortune, as a death in the house near which it persistently calls. Its two eggs are laid among the leaves, needing no other protection than the cover of the mother's body. The whip-poor-will may be accounted one of our most efficient insect destroyers, as its immensely capacious mouth beset with bristles, a regular insect trap, would suggest. Among its prey it includes May beetles and moths. These two form the principal articles of food and as they are parents respectively of the white grub worm and an innumerable host of caterpillars their destruction is of marked benefit to agriculture.

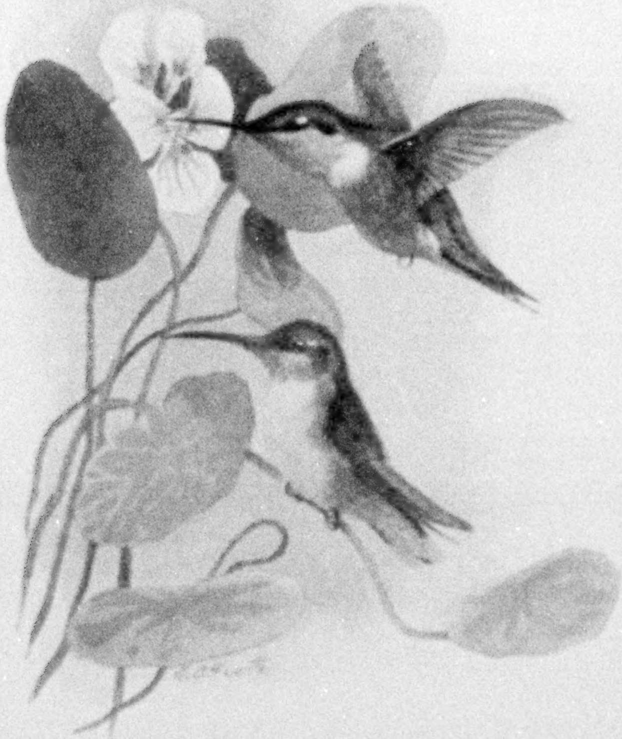
ROAD RUNNER (Geococcyx californianus).

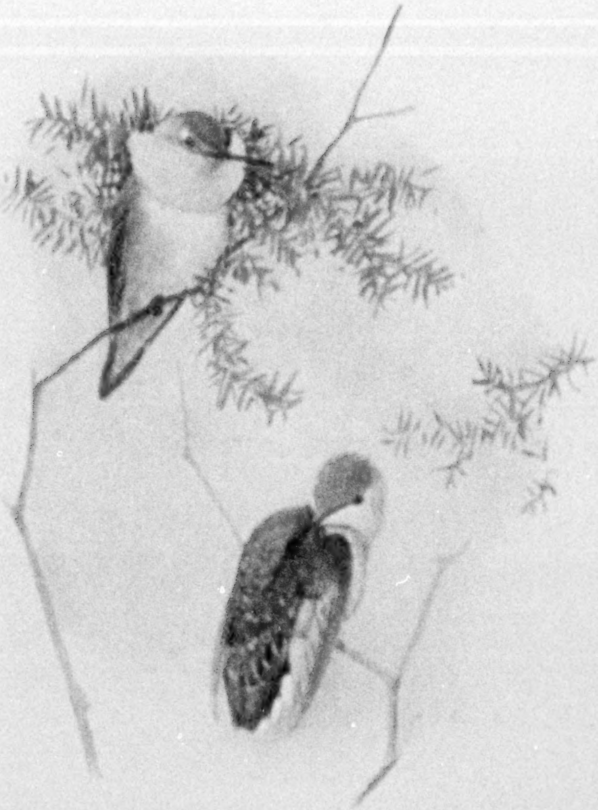
Length, 20 to 24 inches, mostly tail. Quite unlike any other North American bird in form and color.

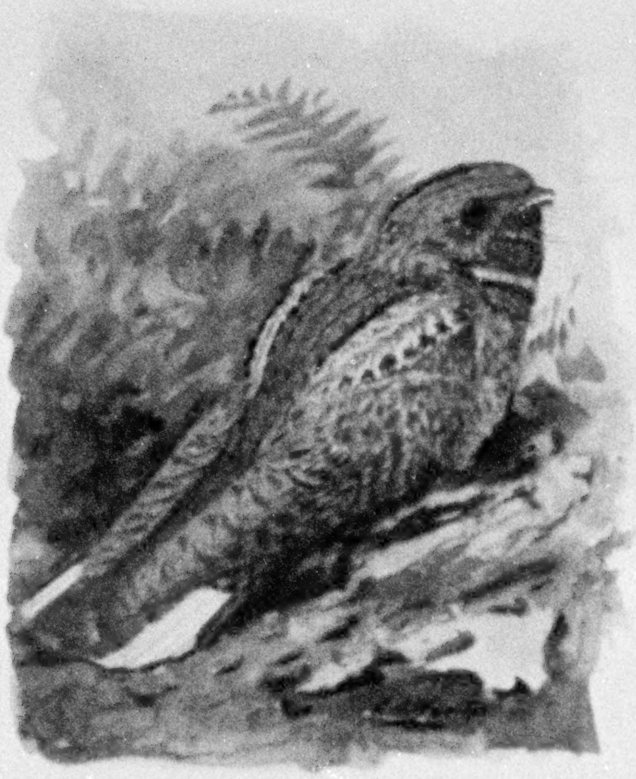
Range: From the upper Sacramento Valley south through California and the peninsula and from Colorado, Kansas, middle and western Texas, Arizona and New Mexico southward; resident.

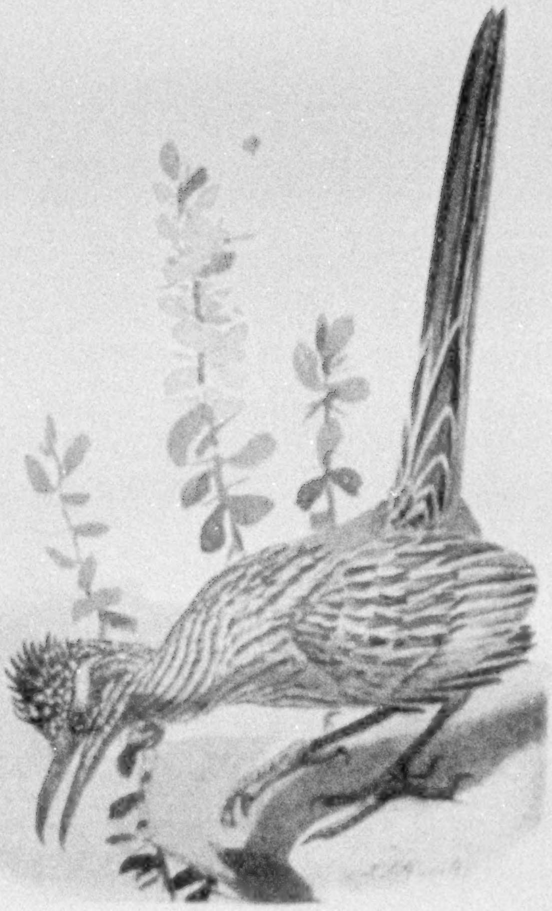
The name "road runner" when applied to a cuckoo may seem an anomaly to those who know only our eastern cuckoos, but in truth the road runner is anomalous in many ways. It is distinguished by curiously marked plumage, the possession of a long bill and a disproportionally long tail. As a result of its strange appearance, and stranger antics, the road runner is made the hero of many a fable. Among other wonders it is claimed that it can outrun the swiftest horse and kill the biggest rattlesnake. It is said to accomplish the latter feat by surrounding the reptile while asleep with a rampart of cactus spines on which the enraged reptile accommodatingly impales itself.

The truth is that when in a hurry this ground cuckoo can run with great speed, though as yet no official record of its best time has been made. Its food consists of a great variety of harmful insects, among which the snout beetles or weevils are conspicuous. It devours also mice, horned lizards, centipedes, land shells and small snakes; probably a young rattlesnake would fare no better than any other small snake. Its notes are difficult to interpret with words, but are not likely to be forgotten when once heard, and they are frequently uttered in the early morning from the topmost bough of a mesquite or other tree.









Ruby-throated Hummingbird
Male, upper; female, lower

Whip-poor-will

Rufous Hummingbird
Male, upper; female, lower

Roadrunner

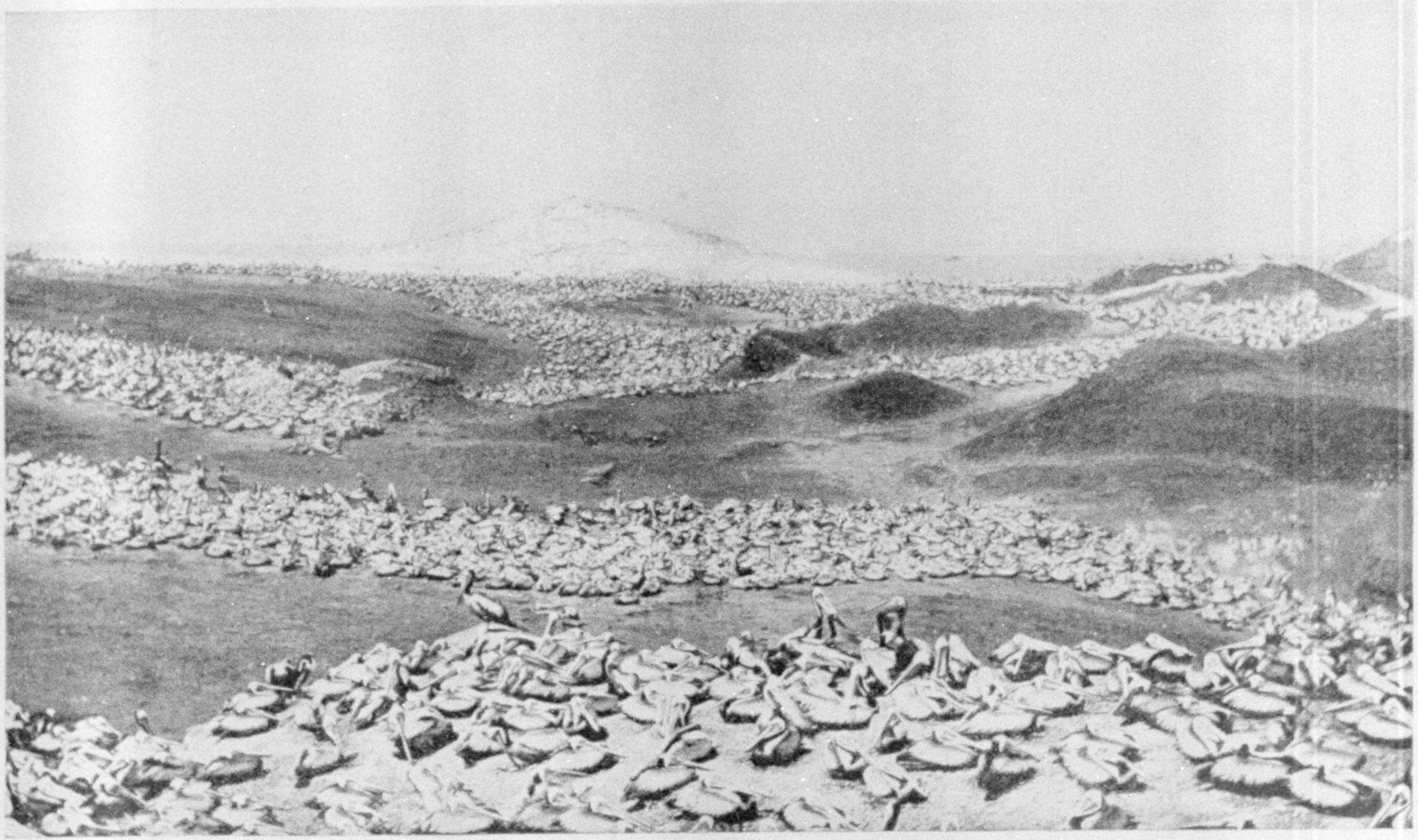


Photo by Robert E. Coker

PELICANS ON THE LOBOS DE AFUEVA ISLANDS, PERU

It was estimated by Mr. Coker that there were upward of 100,000 pelicans, all told, on the eastward island of the Lobos de Afuevas. At the time of the writer's next visit there he saw scarcely any birds near the old rookery. It is one of the tragedies of the guano industry that this important bird has received so little consideration. (See the article, "Wealth of a Rainless Coast," by Robert E. Coker, printed elsewhere in this number.)

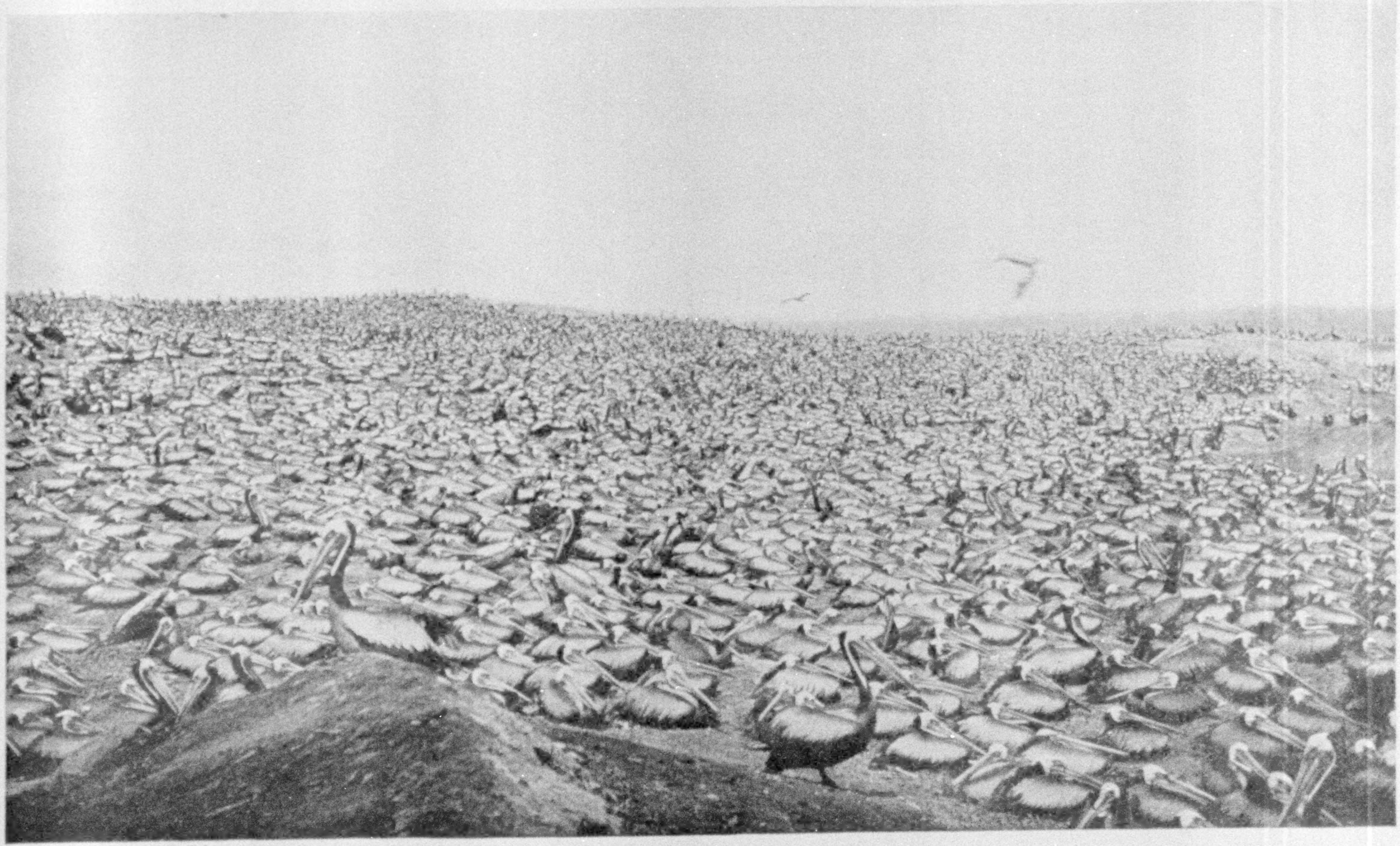
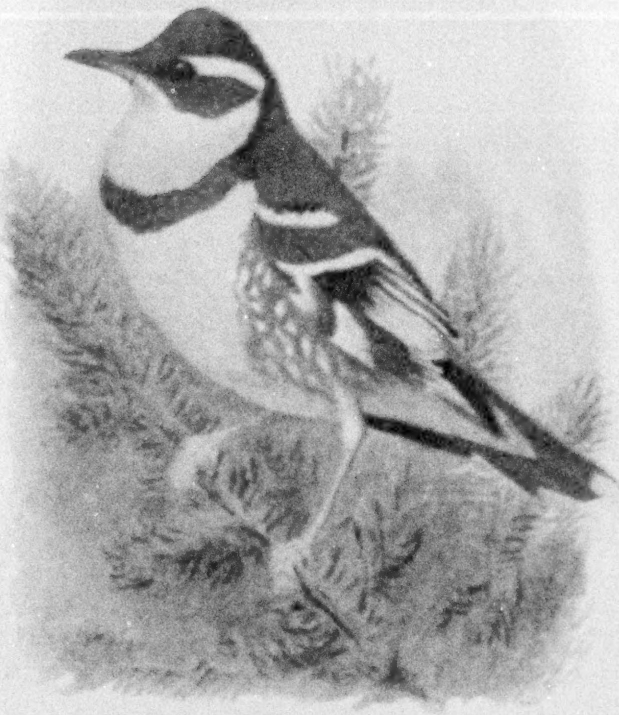
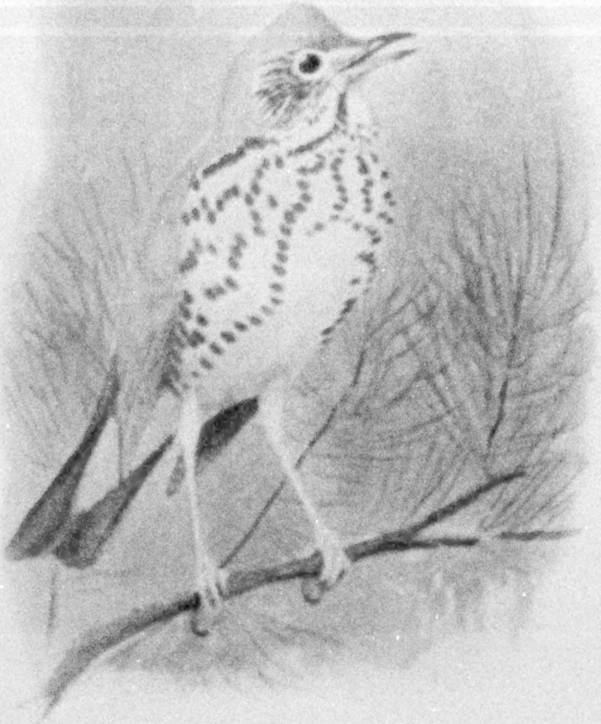


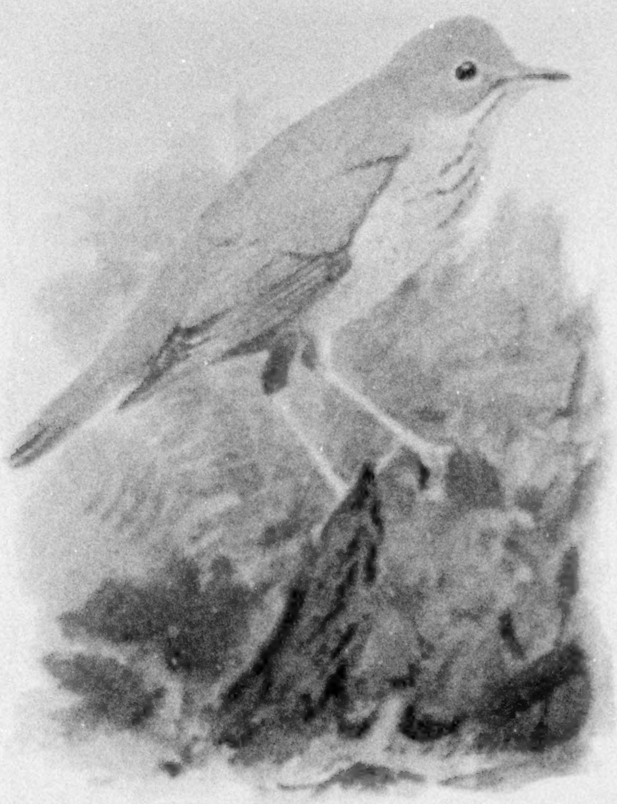
Photo by Robert E. Coker

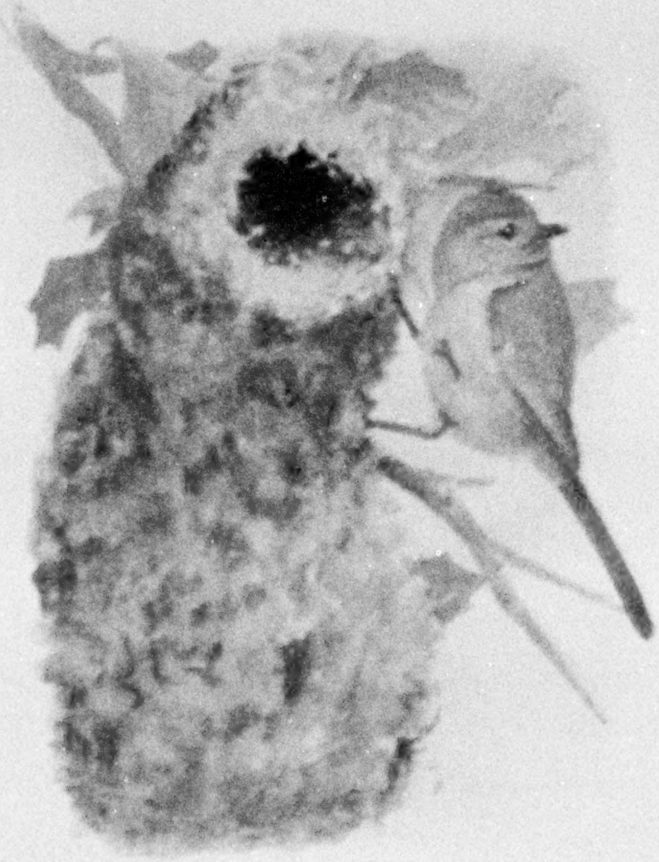
ONE HUNDRED THOUSAND PELICANS

Such an array of big gray birds makes a more showy effect than a vastly greater number of smaller birds. Unfortunately, this great and valuable rookery, unmolested for several years, was not permitted to remain undisturbed. (See the article, "Wealth of a Rainless Coast," by Robert E. Coker, printed elsewhere in this number.)









Varied Thrush
Veery

Wood Thrush
Bush-tit

VARIED THRUSH (Ixoreus nævius).

Length, about 10 inches. Its large size and dark slate-colored upper parts, black breast collar, orange brown stripe over eye and orange brown under parts mark this thrush apart from all others.

Range: Breeds on the Pacific coast from Yakutat Bay, Alaska, south to Humboldt County, California; winters from southern Alaska to northern California.

This, one of our largest and finest thrushes, is limited to the west coast, where it finds a congenial summer home in the depths of the coniferous forests, the mystery and loneliness of which seem reflected in its nature. Although the varied thrush somewhat suggests our robin, it is much shyer, and its habits and notes are very different, making it more nearly akin to the small olive thrushes. It nests in the conifers, and its eggs, unlike those of the robin, are heavily blotched with brown. Its song, a single long-drawn note, has been greatly praised, and seems entirely in harmony with the bird's surroundings, being weird and inspiring. In winter the varied thrush abandons the forest and with it many of the habits of the recluse, and visits more open districts, including ravines and even gardens, where it becomes quite familiar.

This thrush, like its smaller brethren, feeds chiefly on the ground, and its food is largely of vegetable nature, but includes a fair proportion of insects, with millepeds and snails. Unless its habits are greatly modified by the encroachment of civilization on its domain it is not likely to be much of a factor in agricultural affairs, but it will continue to make itself useful by destroying the insect enemies of forest trees.

VEERY (Hylocichla fuscescens fuscescens).

Length, about $7\frac{1}{2}$ inches. To be known from the other small thrushes by its uniform cinnamon brown upper parts and its faint brown breast markings.

Range: Breeds from northern Michigan, central Ontario and Newfoundland south to northern Illinois, northern Indiana, northern Ohio and New Jersey; and in the Alleghenies south to North Carolina and northern Georgia; winters in South America.

Far more retiring than either the wood thrush or the hermit, the veery must be sought in the seclusion of the swamp or swampy woodland, far from the recesses of which he rarely ventures. Much of his time he spends on the ground, for on or near it he finds his chosen fare. Though trim in form and clad in a garb of modest color as befits his nature, the veery appeals less to the bird lover's eye than to his ear. Though some of his relatives are classed among the most famous of American songsters, the veery may fairly claim place in the front rank, and his wild, mysterious and all-pervading notes touch certain chords in the human breast which respond to the song of no other of our birds.

The food of the veery does not differ essentially from that of the other small thrushes and includes a great variety of small wild fruits and insects. As it rarely visits the orchard or farm its insect-eating habits have little direct bearing on the farmer's interest, although indirectly the bird contributes its share to the beneficial work of staying the superabundant tide of insect life. It does, however, eat many weevils, and among them the notorious plum curculio.

WOOD THRUSH (Hylocichla mustelina).

Length, about $8\frac{1}{4}$ inches. To be distinguished among its fellows by its more bulky form, by the golden brown head, bright cinnamon upper parts, and the large round black spots beneath, sharply contrasting with the pure white.

Range: Breeds from southern South Dakota, central Minnesota, central Wisconsin, southern Ontario and southern New Hampshire south to eastern Texas, Louisiana and northern Florida; winters from southern Mexico to Central America.

The wood thrush finds its way to our hearts and sympathies more through its voice than its presence, and whoever has failed to hear its clear flute-like tones rising from the woodland depths as the mists of evening gather has missed a rich treat. It is no doubt true that the Hermit Thrush is a more finished performer, but that chorister reserves his music chiefly for the northern wilds while our wood thrush favors more southern lands. Moreover, the hermit is a true recluse and must be sought in the deeper forest, its chosen home, while its more southern cousin lives in comparatively open woodland and does not disdain to take up its summer residence in parks and gardens. The music of the one is for the favored few, while the song of the other is almost as well known as that of the brown thrasher.

Like most of the tribe, the wood thrush obtains its food chiefly from the ground, where it spends much of its time searching among the leaves. Insects with a small percentage of fruit, chiefly wild varieties, compose its fare. Among the insects are cutworms and other caterpillars, ants, grasshoppers and beetles, including the Colorado potato beetle. Thus the bird deserves a high place in our esteem for both esthetic and economic reasons.

BUSH-TIT (Psaltriparus minimus and sub-species).

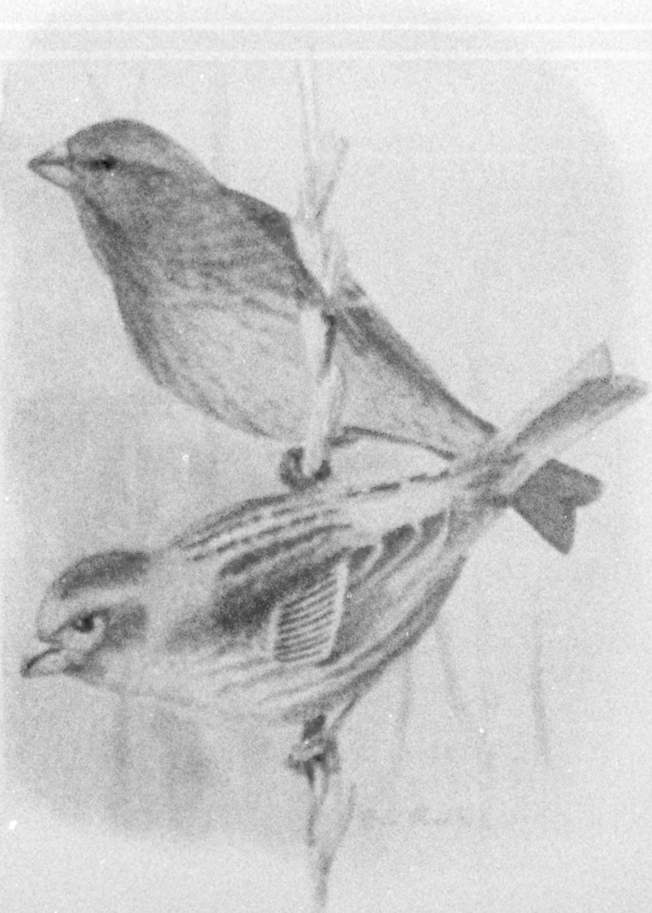
Length, from 4 to $4\frac{1}{2}$ inches.

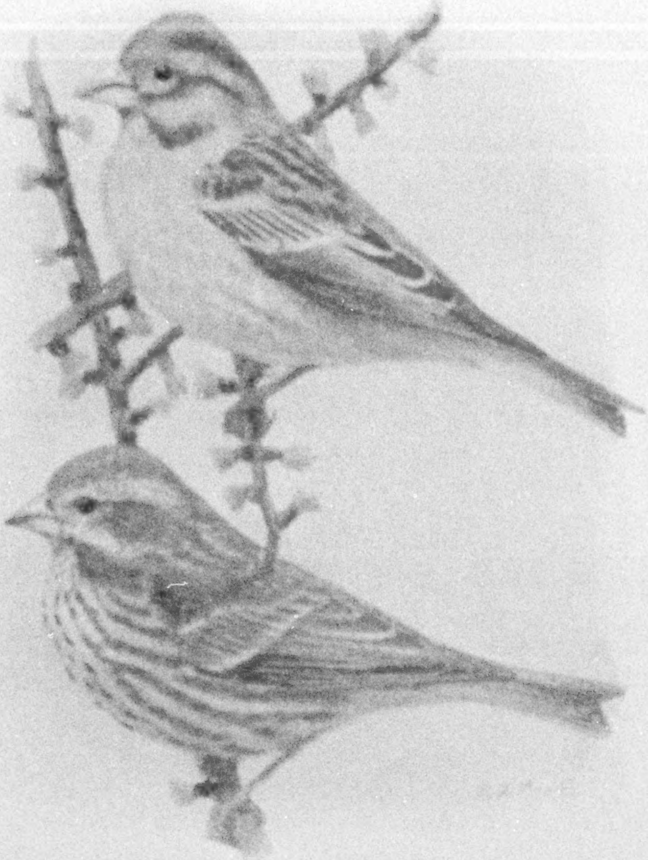
Range: Pacific coast from southern British Columbia to the Cape Region of Lower California, and eastward to the interior of Oregon and California; nests generally throughout its range.

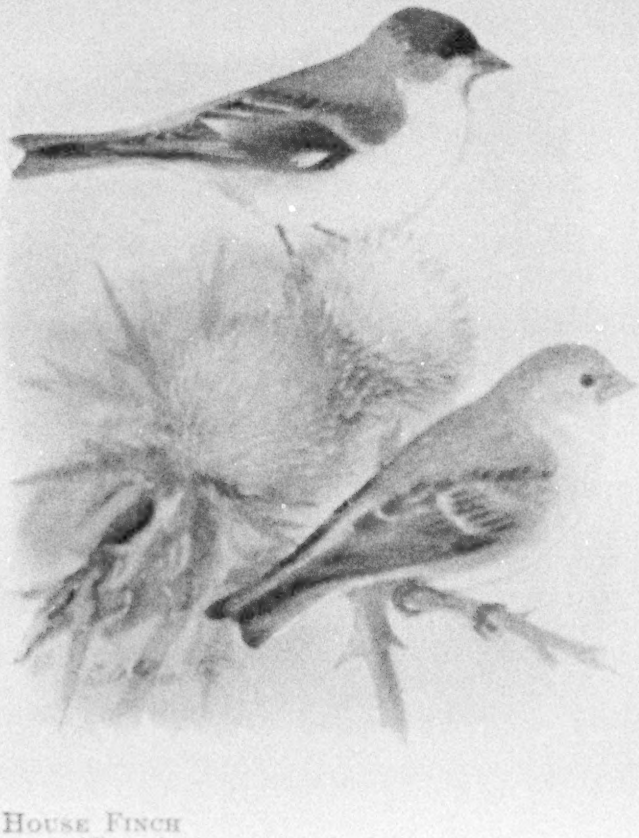
This pigmy among birds has many of the characteristic habits of the chickadee family, of which it is the smallest member. Extremely sociable, bush-tits move about in large flocks, occasionally in company with other birds, generally without. One moment you are alone, the next moment the trees and bushes are full of these diminutive little busybodies that scan you with their curious bead-like eyes as they hurry on in quest of food, keeping up the while a constant calling and twittering. Their pendant nests, often attached to oak trees, suggest the well-known structure of our hang-bird or Baltimore oriole, and are excellent specimens of bird architecture.

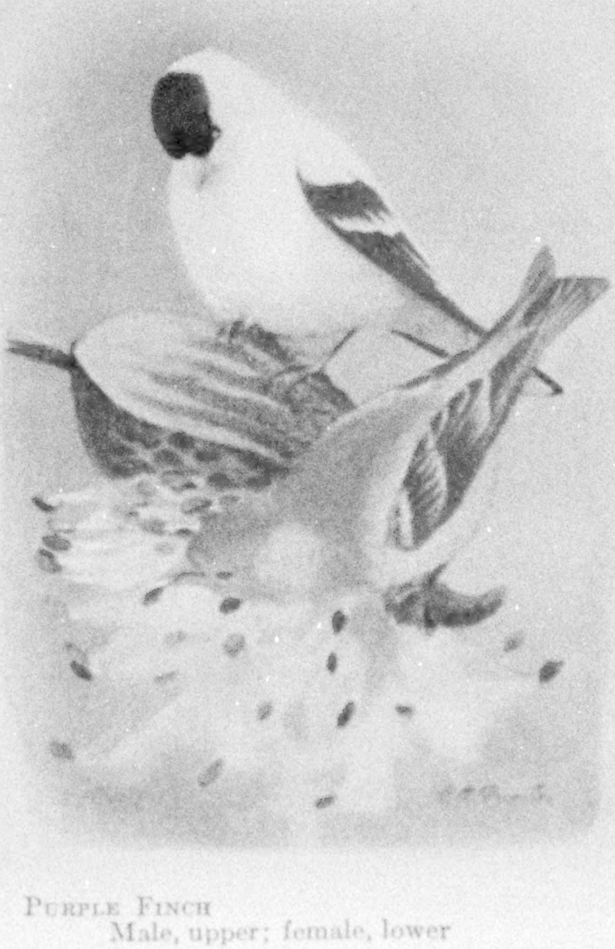
The few western states favored by the presence of this bird are to be congratulated, as more than half its animal food consists of insects and spiders, nearly all of which are harmful. Among the insects are many tree bugs, *Hemiptera*, which contain our most dreaded insect pests, such as the black olive scale and other scales equally destructive. The bush-tit is also a persistent foe of the codling moth in all its stages.

(See Farmers' Bul. 54, p. 44; also Bul. 30, pp.









House Finch
Female, upper; male, lower

Arkansas Goldfinch
Male, upper; female, lower

Purple Finch
Male, upper; female, lower

American Goldfinch
Male, upper; female, lower

HOUSE FINCH (**Carpodacus mexicanus frontalis**).

Length, about 6 inches. Grayish brown above, many feathers tinged with red. Below dull white, crown, rump, and throat crimson.

Range: Resident in Oregon, Idaho and southeastern Wyoming south to Lower California and Mexico.

The pretty little house finch of the far west is among the most domestic of American birds, and exhibits a predilection for the neighborhood of houses almost as strong as that of the English sparrow. It carols its sprightly lay from the tops of buildings in villages and even cities, and from the shrubbery of lawn and park. So confiding has the bird become that it places its nest in any crack or cranny of house or outbuilding that is large enough for its housekeeping operations. When such convenient and safe retreats are not to be had it builds a bulky nest in a tree or bush.

It is fond of fruit, including pears, cherries, and small fruit, which its strong conical bill enables it to break open with ease. Locally, therefore, it is a good deal of a pest and does much damage to fruit crops, especially where it is numerous. Much, however, can be said in mitigation of its offenses. The seeds of plants, a large proportion of those of noxious weeds, constitute seven-eighths of its food for the year. Plant lice which are notoriously harmful to many trees and plants, also are a favorite diet. So too are caterpillars and beetles; therefore, the balance is decidedly in the bird's favor.

This attractive songster was carried to the Hawaiian Islands years ago and now is numerous in Honolulu and also in the forest on the island of Hawaii where amid brighter and more tropical neighbors it seems curiously out of place, though it sings as often and as joyously as it ever did in its old haunts across the Pacific.

ARKANSAS GOLDFINCH (**Astragalinus psaltria** and sub-species).

Length, about 4½ inches. Upper parts olive green, more or less mixed with black in the sub-species; under parts yellow.

Range: Breeds from southern Oregon, Utah and northern Colorado to southern Lower California and into Mexico.

In the far west this goldfinch takes the place of the eastern goldfinch which in a general way it much resembles in habits. Like that bird it is rarely seen, save in the breeding season, except in small parties, the members of which seem to be on terms of the utmost familiarity and accord. The flight of this species, as of its kindred, is exceedingly characteristic. It disdains to cleave the air in straight lines but progresses in a series of graceful sinuous curves, which, however, take the little aeronaut rapidly from point to point. This flight is a sure mark of identification. The bird has a sweet warbling song and even its call notes are plaintive and pleasing. It abounds in orchards and gardens and is often to be seen by the roadside gleaning its food from the tall stems of thistle, sunflowers, groundsel and other seed-bearing plants and weeds, all of them either useless or positively harmful. It is by no means wholly a vegetarian, however, and eats many plant lice, sometimes filling the stomach with these minute creatures to the exclusion of all other food. As a weevil eater it is peerless, and it does no harm to any product of husbandry. Altogether this pretty little goldfinch deserves protection at the hands of man.

PURPLE FINCH (**Carpodacus purpureus**).

Length, about 6 to 6¼ inches. Unlike any other eastern finch, the crimson head of the male sufficiently distinguishes it.

Range: Breeds in southern Canada and southward to North Dakota, Minnesota, Illinois, Pennsylvania mountains, and northern New Jersey; winters from somewhat north of the southern boundary of its breeding range to the Gulf States.

Considering that it is common and widely distributed, the purple finch is not so well known as it should be. For one thing it has a marked liking for the tops of trees, particularly elms, and when in a tree top and more or less screened by foliage it requires the aid of a good glass to make its identity sure. Its warbling song is sweet and melodious but is all too brief for perfect enjoyment, though in spring the bird is prodigal enough of its carols, and not infrequently a dozen males may be heard singing at once in the same or in contiguous trees. It frequently nests around houses and for a site is very partial to the Virginia Juniper.

The purple finch lives almost entirely on the seeds of various plants, including those of false buckwheat and ragweed, with some wild berries. It is accused, not without reason, of being a confirmed budder of fruit and other trees, but the damage it inflicts on eastern orchards appears to be very slight, if indeed the modest budding it does is an injury at all.

AMERICAN GOLDFINCH (**Astragalinus tristis** and sub-species).

Length, about 5 inches. Easily distinguished by its rich yellow plumage and black crown and tail.

Range: Breeds from southern Canada south to southern California, southern Colorado, Arkansas and northern Georgia.

The thistle bird is one of our best known finches, being not only common but very sociable. It usually goes in small flocks, or family parties, and sometimes the tall thistles on which it likes to feed bend with the united weight of several of the gay plumaged little goldfinches. It is a law unto itself as regards its nesting period, and begins to think seriously about housekeeping when other birds are feeding full grown youngsters, or are debating the propriety of a second brood. The goldfinch has a pretty and plaintive call note, and its full song is well worth listening to. It is much like that of the canary, so much alike, in fact, that the bird is often called the wild canary.

Throughout the year the goldfinch is a seed eater, especially of weed seeds, and it eats also many insects, including canker worms, plant lice, and beetles. Our goldfinch sometimes annoys the farmer by attacking the lettuce seeds which have been left to mature for next season's planting, but the damage in this way is slight, and Prof. Beal has been told that even on the large seed farms of California it is never serious enough to call for protective measures.

(See Biol. Surv. Bul. 17 and Bul. 34, pp. 71-73.)

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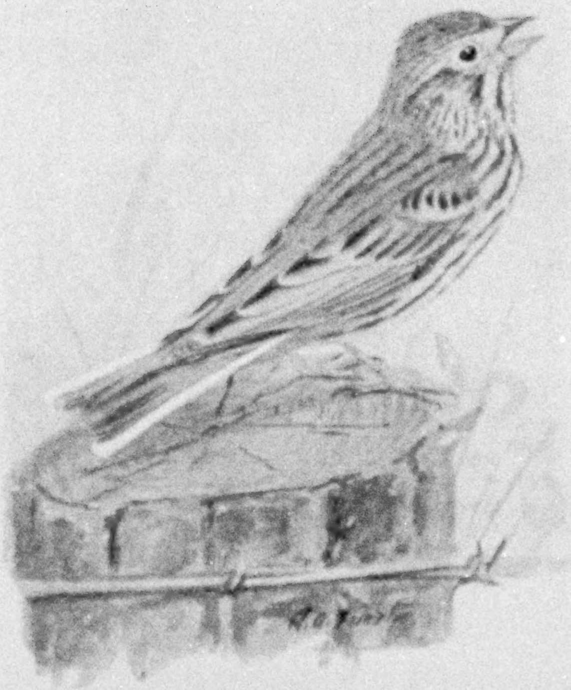
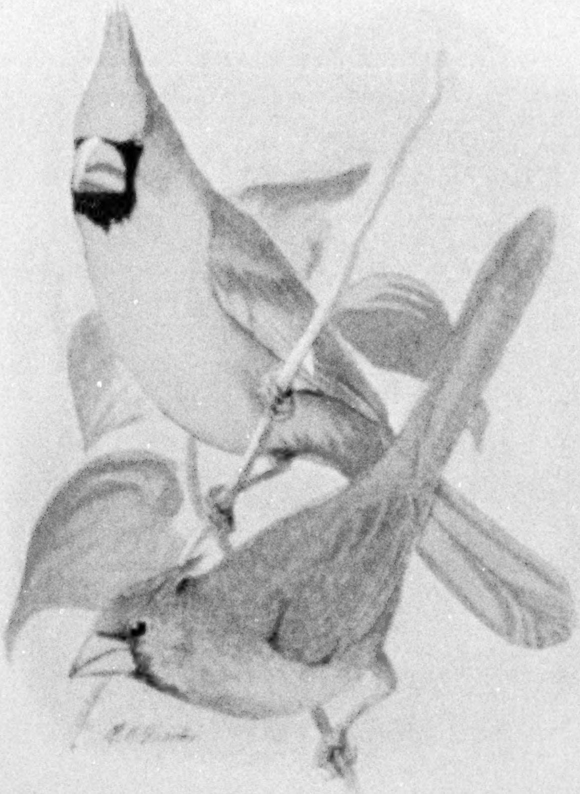
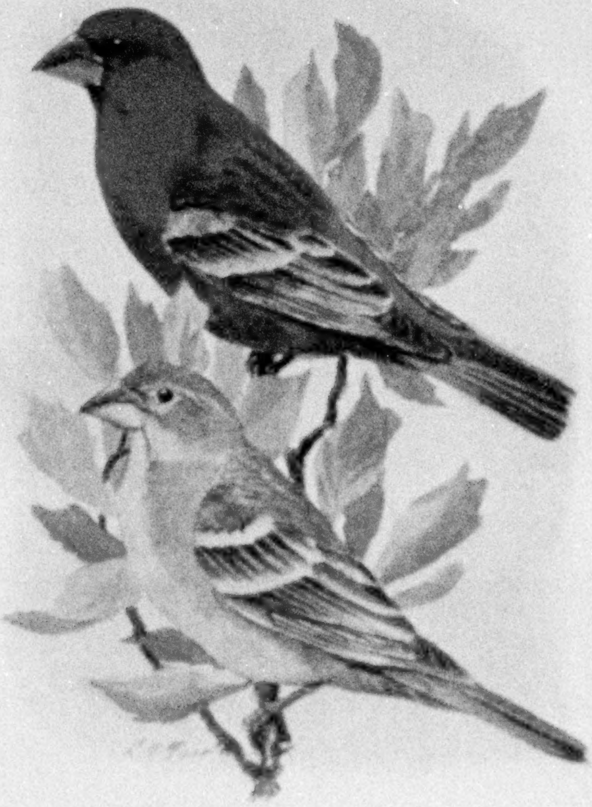
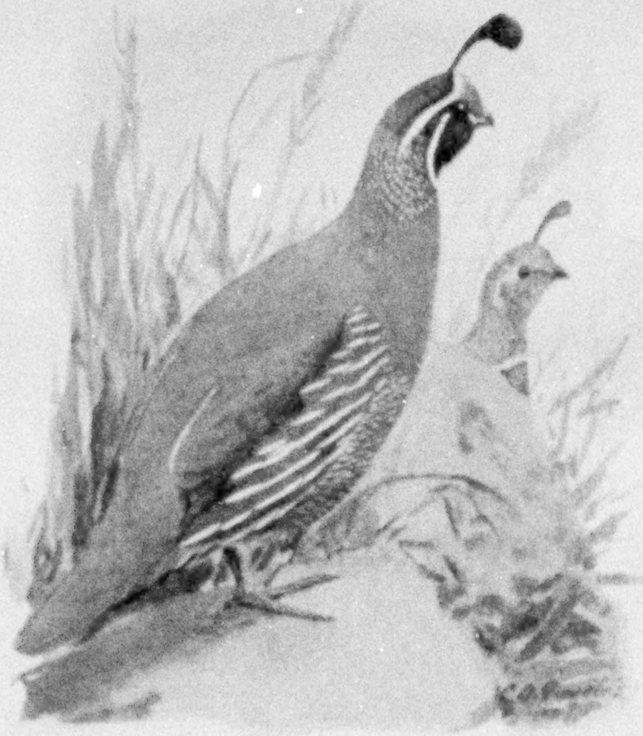








Vesper Sparrow
Blue Grosbeak
Male, upper; female, lower

Cardinal
Male, upper; female, lower
California Quail

VESPER SPARROW (**Pooecetes gramineus** and sub-species).

Length, about 6 inches. Its white tipped outer tail feathers distinguish this individual from its brown liveried fellows.

Range: Breeds from southern Canada south to Oregon, Arizona, Texas, Kentucky, Virginia and North Carolina; winters from southern California, Texas, Missouri and North Carolina, south to the Gulf coast and southern Mexico.

There is little about this brown streaked sparrow to attract attention and, until it flies and displays the white tipped tail feathers, you might mistake the bird for any one of a half dozen of the sparrow family. Indeed if one catches merely a glimpse of a vesper sparrow crouched low and running swiftly through the grass one may be forgiven for mistaking the bird for a mouse. It frequents open pastures and when singing likes to mount a rocky boulder so common in New England and other parts of the east. We are perhaps justified in calling its song its most notable characteristic. Though not a pretentious effort the voice of the vesper sparrow is sweet and plaintive beyond expression, and harmonizes with the dying day as does the song of no other bird.

Prof. Beal records the fact that in winter the food of this sparrow consists wholly of vegetable matter, while in summer it consists of little else than insects. The vesper sparrow cares less for grass seed than any other of its fellows but consumes great quantities of weed seeds. It eats also large numbers of grasshoppers, caterpillars and weevils. A number of these sparrows taken in Utah where the newly imported alfalfa weevil is doing much damage were found to have eaten these weevils to the average extent of more than half their food. Thus the value of this bird to the farmer cannot be questioned.

BLUE GROSBEAK (**Guiraca cærulea** and sub-species).

Length, about 7 inches. Distinguished by its larger size from the indigo bird which alone resembles it.

Range: Breeds in the southern United States north to northern California, Colorado, Nebraska, southern Illinoisand Maryland andsouth to southern Mexico; winters in Mexico and Central America.

One seldom sees the blue grosbeak at short range or under circumstances which make identification easy, as the bird is rather shy and frequents brushy thickets and viny tangles much as does the indigo bird. The low warbling song of this grosbeak may be compared with that of the purple finch but it is neither so loud nor so well sustained. Under the name of "blue pap" the grosbeak used to be a favorite cage bird in Louisiana and other southern states, and no doubt is so today, despite protective laws. In the matter of diet it shows a marked preference for insect food over vegetable, the proportion being about 67 to 33 per cent. The vegetable matter includes many weed seeds, as foxtail and bindweed, also corn, the taking of which makes a black mark against its record. As, however, the bird consumes twice as much animal matter as vegetable, the balance is much in its favor and it accordingly earns protection as well by its economic service as by its beauty and song.

CARDINAL (**Cardinalis cardinalis** and sub-species).

Length, about 8¼ inches. Its size, crest and bright red color serve for instant identification.

Range: Southern United States generally, west to Texas and southern Arizona, north to lower Hudson, northern Ohio, northern Indiana, southern Iowa and southeastern South Dakota; resident.

The cardinal is a notable bird and any locality he chooses for his residence must be considered highly favored. His bright colors, trim form and erectile crest, his clear whistling call, and his fine song are all to his credit. He is a resident of thickets and tangled undergrowth with hanging vines, and, when these are provided and he feels safe from the prowling cat and marauding hawk, he will take up his abode in your garden or back yard as readily as anywhere else. Favor him further by supplying him food and water in winter and you make him your friend indeed. Practically he is a resident wherever found and the sight of his flashing red suit amidst snow covered bushes is a memorable picture. The cardinal used to be a favorite cage bird in the Southern States and the business of trapping him for market, especially about the large southern cities, was common. The bird is now protected by law as it should be, and the sight of a cardinal behind prison bars has become rare indeed. How many thousands were sacrificed for hat gear we shall never know but happily this practice too is fast disappearing.

By preference the cardinal is a vegetarian, and about seven-tenths of its food consists of vegetable matter in the form of seeds, berries, etc. But it also eats many insects, potato beetles, cotton worms, boll worms, cotton-boll weevils, codling moths and many other scarcely less note worthy. Mr. McAtee in attempting to sum up all the economic facts, declares that the bird does at least fifteen times as much good as harm, which is a record to be proud of.

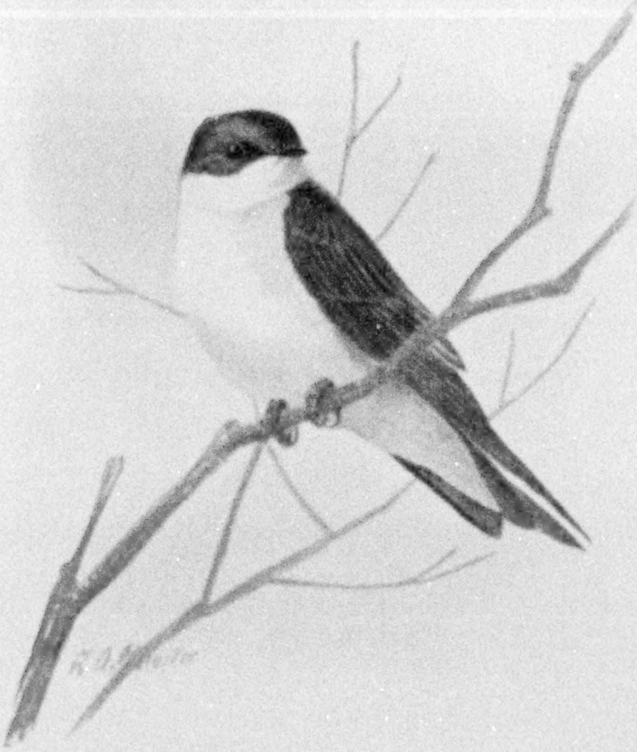
CALIFORNIA QUAIL (**Lophortyx californica** and varieties).

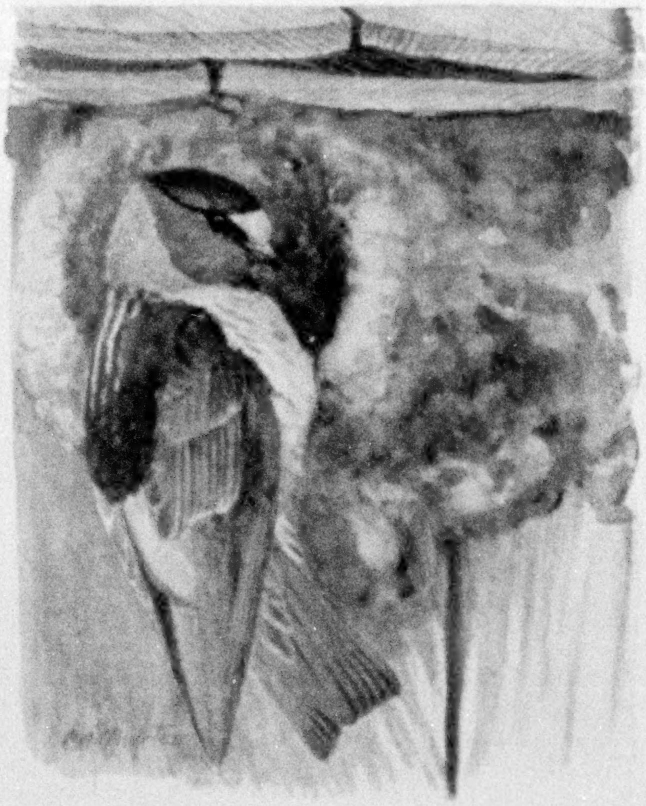
Length, about 9½ inches. Distinguished from Gambels' quail by the reddish instead of black belly.

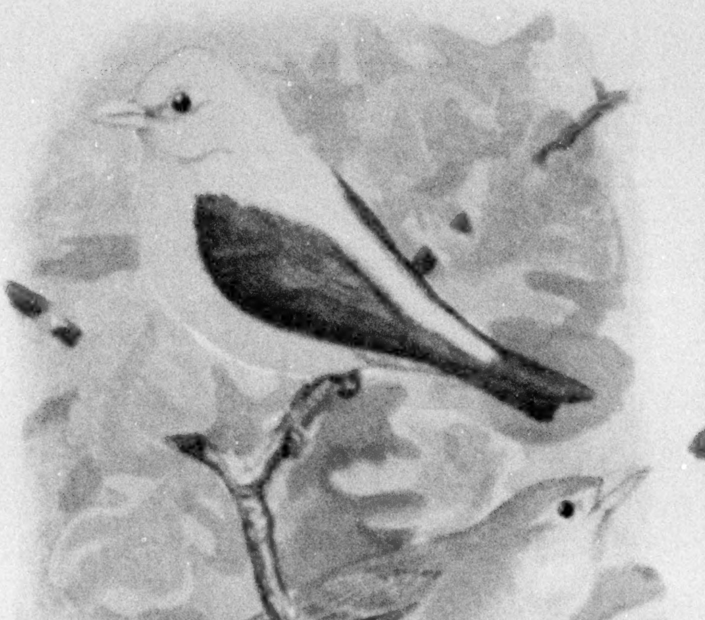
Range: Resident in the Pacific Coast region from southwestern Oregon and western Nevada through California and Lower California.

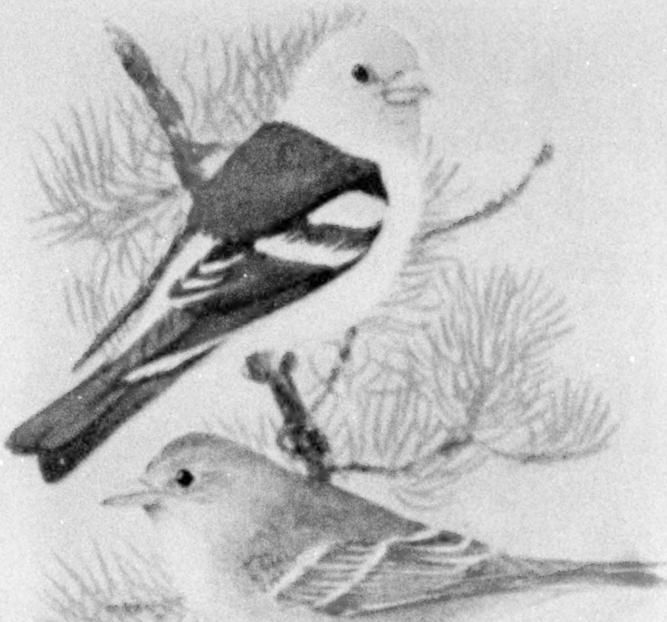
The California quail is one of our most beautiful game birds and the sight of a large covey running daintily along, with crests nodding and fine plumage gleaming in the sun is a sight to remember. Before quail were so much persecuted, covies were common in the gardens of Oakland and other California towns, seemingly as much at home among calla lilies and rosebushes as in the stubble field. The numerous families in the fall associate in bands of three or four hundred, or even more. The California quail has learned one lesson never acquired by our bob-white—to roost in trees and bushes instead of on the ground, and no doubt the safety thus obtained during the hours of darkness is one reason for its great abundance.

This quail is the greatest vegetarian of any of our game birds, the vegetable food eaten by over 600 individualsexamined amounting to 95 per cent of the total food consumed. Unfortunately the California quail consumes much grain when germinating and thus damages the growing crop; it also attacks grapes and, while it does not eat a great many, it seriously damages bunches by puncturing a few grapes here and there, so ruining the fruit for market.









Tree Swallow
Scarlet Tanager
Male, upper; female, lower

Cliff or Eaves Swallow
Western Tanager
Male, upper; female, lower

TREE SWALLOW (Iridoprocne bicolor).

Length, about 6 inches. The steel blue upper parts and pure white under parts are distinguishing characteristics.

Range: Breeds from northwestern Alaska and northern Canada south to southern California, Colorado, Kansas, Missouri, and Virginia; winters in central California, southern Texas and Gulf States and south to Guatemala.

In its primitive state the tree swallow used to nest in hollow trees, and in some parts of the country it still continues to do so. Early in the settlement of the country it saw the advantage of putting itself under man's protection, and now no bird is quicker to respond to an invitation to nest in a box dedicated to its use. The bird lover within the range of the species may secure an interesting tenant or two by the expenditure of a little trouble and labor, since the bird is not a bit fastidious as to its domicile, providing it is weather tight. Tree swallows arrive from the south early in April and soon begin to nest. In the fall they gather in great flocks preparatory to their departure, and may then be seen by hundreds perched on telegraph wires. As is the habit with swallows generally, tree swallows migrate by day feeding as they go, and a flock passing swiftly south presents to the casual observer an every day appearance well calculated to deceive. Watch the flock as it crosses the road and passes from field to field and you will notice that while the line of flight has many a twist and turn it trends steadily to the south and that no individual takes the back track.

The tree swallow consumes vast numbers of gnats, flying ants, beetles, mosquitoes and other flying insects. It exhibits a rather curious departure from the traditions of its kind in that it appears to be very fond of the berries of the bayberry or wax myrtle. It also often chooses these bushes for a roosting place at night.

SCARLET TANAGER (Piranga erythromelas).

Length, about 7¼ inches. The scarlet coat and black wings and tail mark this bird out from all others.

Range: Breeds from southern Canada south to southern Kansas, northern Arkansas, Tennessee, northern Georgia and mountains of Virginia and South Carolina; winters from Colombia to Bolivia and Peru.

The tanagers are strictly an American family, and as their bright colors might seem to suggest, they originated in the Tropics to which most of the numerous species are confined. In fact the gleam of scarlet from the coat of this tanager in our somber woods always seems a little out of place as though the bird were an alien. But it is wholly at home with us, and, indeed, does not hesitate to make its summer residence still farther north in Canada. Curiously enough the nearest relatives of the brilliant tanagers in the bird world are the plainly colored sparrows. The chirp-churr of the tanager is a familiar call note in our northern woods, while its song is one of the sweetest; so that altogether this species is to be classed as a notable member of our bird world.

In some localities it is accused of eating honey bees, but to offset this local habit it devours the potato-beetle and many other beetles and a great variety of caterpillars. Blueberries and other small berries also form an important part of its food.

CLIFF SWALLOW (Petrochelidon lunifrons and sub-species).

Length, about 6 inches. The rufous upper tail coverts serve to distinguish this swallow from other species.

Range: Breeds from central Alaska and northern Canada south over the United States (except Florida) and to Guatemala; winters in South America.

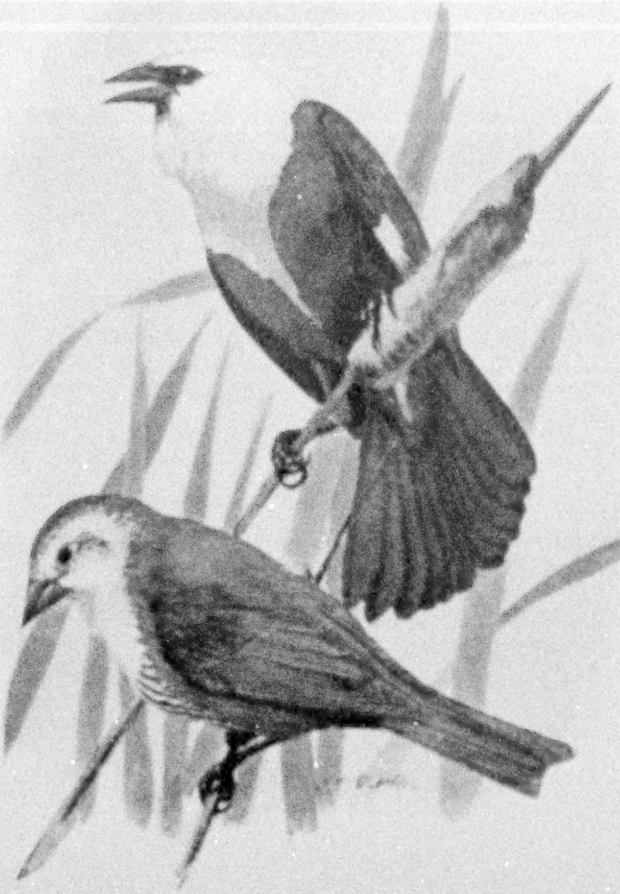
The cliff and the barn swallow are members in good standing of the original guild of masons, and their clever constructive work in nest building with mud pellets will bear the severest professional inspection. Through much of the west the cliff swallow still attaches its mud house to the faces of cliffs as from time immemorial, and it was not until the farmers' house and barn offered a satisfactory substitute for granite and sandstone bluffs, that the bird became really numerous in our eastern States. In some localities this swallow is not a welcome guest about the homestead as its nest is apt to contain parasites which the good housekeeper fears. Such parasites, however, are not to be dreaded as they will live only on birds. The cliff swallow performs invaluable service to man since its food consists wholly of insects, and among them are many pestiferous kinds, such as leaf bugs, leaf-hoppers and the boll weevil. Whoever then protects this and other species of swallows and encourages their presence on their premises does good and patriotic service and can moreover be sure of adequate reward.

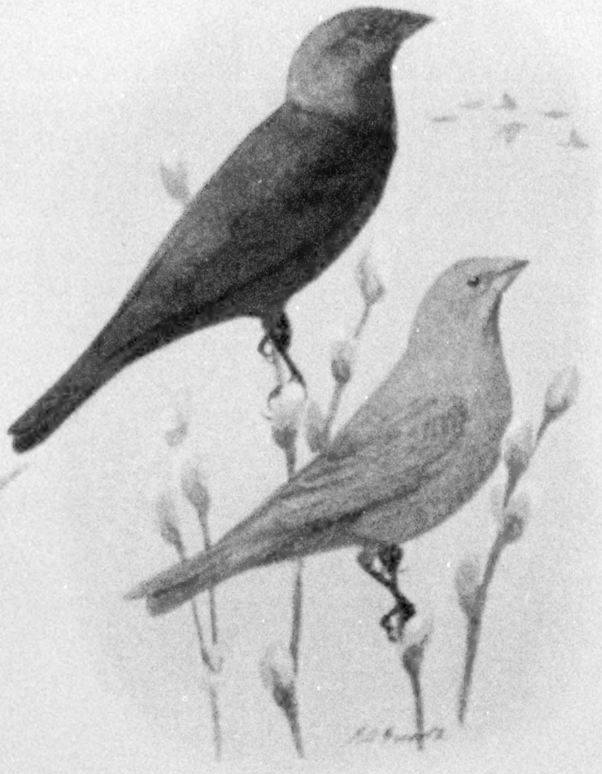
WESTERN TANAGER (Piranga ludoviciana).

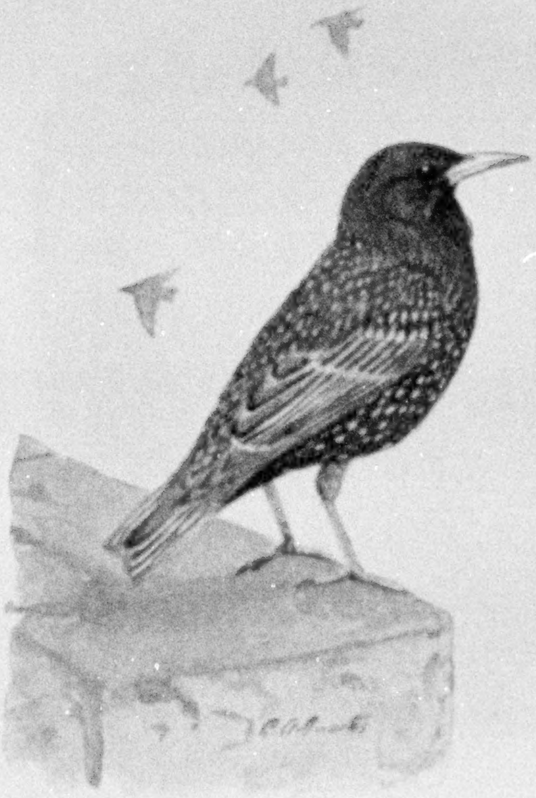
Length, about 7 inches. The combination of orange-red head, black back, and yellow under parts are distinctive.

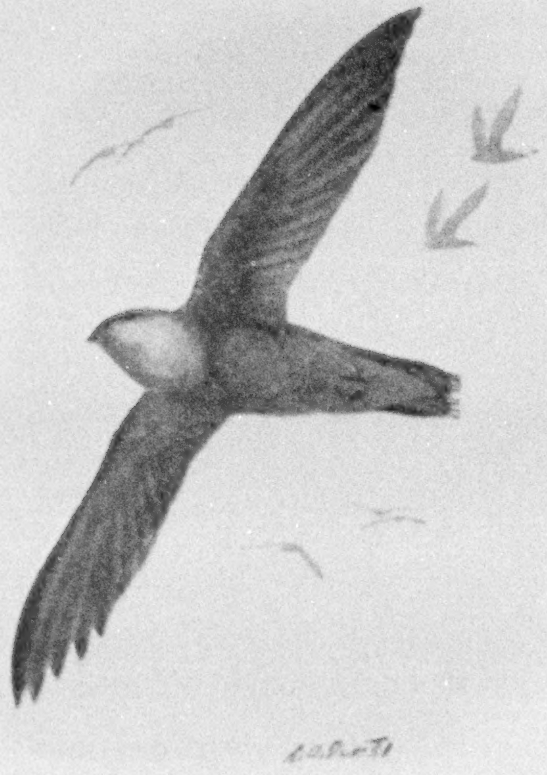
Range: Breeds from northeastern British Columbia, southwestern Mackenzie and southwestern South Dakota to the mountains of southern California and New Mexico; winters from central Mexico to Guatemala.

Discovered in Idaho by Lewis and Clarke in 1806, this tanager has thus been known more than a hundred years in which time it has become one of the most familiar of western birds. It is a common inhabitant of both the western Rocky Mountains and the Sierra Nevada, and is very much at home among the pine woods of which it is the brightest ornament. In general its habits are like those of its scarlet cousin, and it also has a sweet song very similar in general effect. In California this tanager has acquired an evil reputation by attacks on the cherry crop, and there is no doubt that when it assembles in large numbers in the fruit districts it is the cause of heavy loss to small fruit growers. Under ordinary circumstances, however, the greater part of its food consists of insects, many of them harmful, and it is only fair to balance the good the bird does against the harm. Two very harmful families of beetles, whose larvæ are wood borers and do much damage to trees and other plants, are represented in the food. The planting of berry bearing trees near the orchard would no doubt prevent much of the loss, occasioned by this bird, which by no means occurs every year. For the rest the fruit grower must be allowed to protect his fruit in the best and most effective way.









Yellow-headed Blackbird
Male, upper; female, lower
Starling

Cowbird
Male, upper; female, lower
Chimney Swift

YELLOWHEAD (Xanthocephalus xanthocephalus).

Length, about 10 inches. Our only blackbird with a yellow head.

Range: Confined to western North America. Breeds from southern British Columbia, southern Mackenzie, southwestern Keewatin, and northern Minnesota to southern California and Arizona, east to southern Wisconsin, Illinois and Indiana; winters from southwestern California, southern Arizona, southeastern Texas, and southwestern Louisiana south into Mexico.

Apparently Nature started out with the intention of making an oriole but decided to make a blackbird instead—and behold the yellowhead. He is a sociable chap and nests in great companies in the tule swamps of the west. The yellowhead's voice is harsh and guttural and his vocal efforts have been well characterized as a maximum of earnest effort with a minimum of harmony. Late in midsummer when the young are on the wing, old and young betake themselves to the uplands, grain fields, pastures and corrals, associating as often as not with redwings and Brewer's blackbirds. The yellowhead feeds principally upon insects, grain and weed seed, and does not attack fruit or garden produce; but it does much good by eating noxious insects and troublesome weeds; where too abundant it is likely to be injurious to grain.

(See Biol. Surv. Bul. No. 13, 1900, p. 32.)

STARLING (Sturnus vulgaris).

Length, about 8½ inches. General color dark purple or green with reflections; feathers above tipped with creamy buff. In flight and general appearance unlike any native species.

Range: At present most numerous near New York City. Has spread to Massachusetts, Connecticut, New Jersey, Pennsylvania, Maryland, Virginia and recently to the District of Columbia; resident where found, though wandering southward in winter in search of food.

The Old World has sent us two bird pests, the English sparrow and the starling. Although, up to the present time, we cannot convict the starling of having done any great damage he has proclivities which make him potentially very dangerous. Introduced into New York in 1890, the original sixty have multiplied many fold and spread in all directions till now they occupy territory hundreds of miles square, and are multiplying and spreading faster than ever. On the north they have entered Massachusetts and Connecticut, and on the south they have reached Richmond, though only in migration. Even as I write the calls of a flock of 200 or more can be heard coming from a neighboring park, but as yet the bird has not elected to summer in the National Capital. The starling is a hardy, prolific bird and is also aggressive. Like the English sparrow it associates in flocks, which is a great advantage in bird disputes. There is little doubt that the effect of its increase and spread over our country will prove disastrous to native species such as the bluebirds, crested flycatchers, swallows, wrens and flickers, all valuable economic species, which nest in cavities as does the starling. Then too the starling has a taste for grain and small fruits, especially cherries, which will not commend it to our farmers and orchardists.

COWBIRD (Molothrus ater).

Length, about 8 inches. Male glossy black, head, neck and breast brown. Female brownish gray.

Range: Breeds from southern British Columbia, southern Mackenzie and southeastern Canada south to northern California, Nevada, northern New Mexico, Texas, Louisiana and North Carolina; winters from southeastern California and the Ohio and Potomac Valleys to the Gulf and to central Mexico.

Chapman calls the cowbird a villain—but is not the villain in the piece often the most interesting character on the stage? Thus our cowbird, short as he is of manners and morals, cannot fail to interest the bird lover. He is full of idiosyncrasies that keep one guessing. Why for instance his close association with the peaceful cow? Why his ludicrous attempts to sing, he who has not a thread of music in his whole make-up? How did Madame Cowbird come to lapse from the paths of virtue and, in place of building a nest of her own, foist her eggs and the care of her offspring on smaller and better principled birds to their detriment? Leaving these conundrums for wiser heads to solve, I must say that the cowbird seems to have chosen the smooth path to prosperity. It makes an easy livelihood, having no parental cares or worries, and is common and widely distributed. The farmer seems to have little to complain of in respect to the bird's food habits.

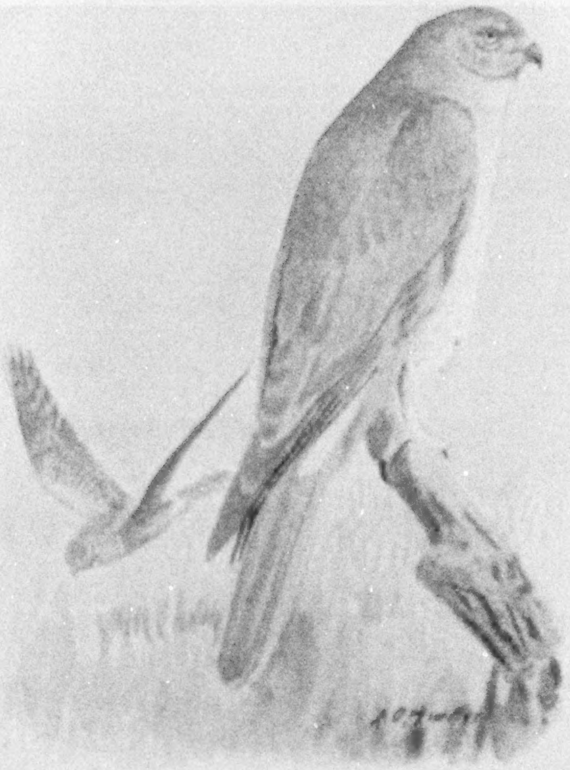
(See Biol. Surv. Bul. 13, p. 29, 1900.)

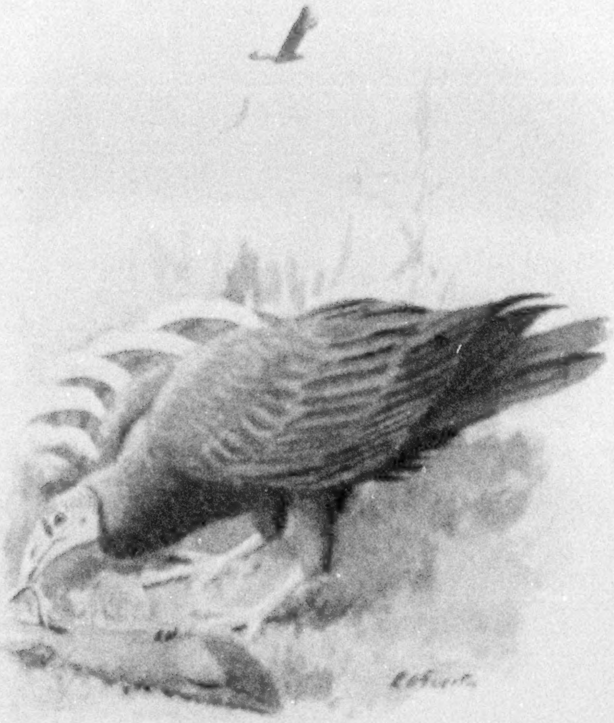
CHIMNEY SWIFT (Chætura pelagica).

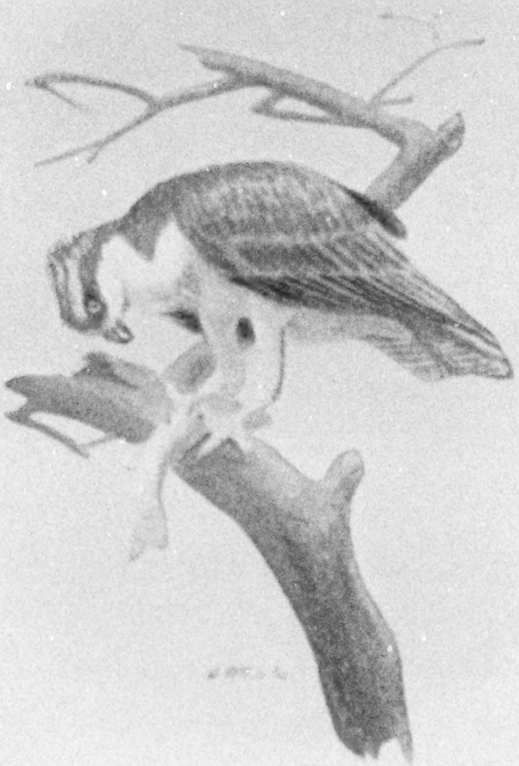
Length, rather less than 5½ inches. Too well known by its peculiar flight and habits to need describing.

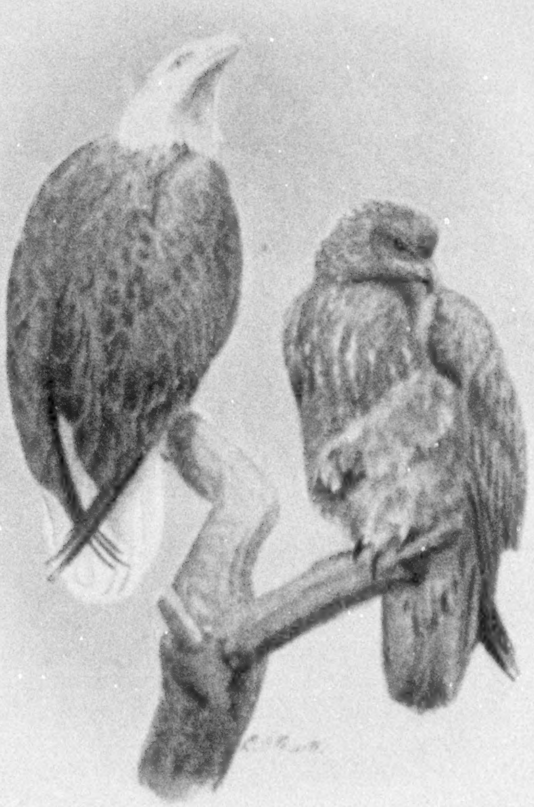
Range: Known only in eastern North America. Breeds from southeastern Saskatchewan, Manitoba, Quebec, and Newfoundland south to Gulf Coast; west to Plains from eastern Montana to eastern Texas; winters south of the United States.

The popular name of this bird, chimney swallow, embodies an error since the bird not only is not a swallow but is not even distantly related to the swallow family. Unlike the humming birds as the chimney swift is in appearance and habits, it is structurally not far removed from them. Like the swallows it is an indefatigable skimmer of the air and like them it earns a debt of gratitude by destroying vast numbers of our winged enemies, which its unsurpassed powers of flight enable it to capture. Indeed, chimney swifts eat nothing but insects, and no insect that flies is safe from them, unless it be too large for them to swallow. In June swifts may be seen gathering twigs for nest material. They disdain to pick these up from the ground but seize the coveted twig with their strong feet and break it off from the terminal branch when in full flight. By means of a sticky saliva secreted for the purpose the swift glues these twigs to the sides of the chimney in the form of a shallow nest. Although not generally known, swifts roost in chimneys and cling to the walls by using the sharp pointed tail as a prop, as do many woodpeckers in ascending trees. Any bird lover may secure distinction by solving an ornithological riddle and telling us where our chimney swifts spend the winter. They come in spring, they go in fall and at present that is about all we know of the matter, save that they do not hibernate in hollow trees, as many have believed.









MARSH HAWK
OSPREY

TURKEY BUZZARD
BALD EAGLE
Male, upper; immature, lower

MARSH HAWK (Circus hudsonius).

Length, about 19 inches. The ashy upper parts, white rump and long tail of the adult male sufficiently distinguish this hawk; while the fuscous upper parts and buff under parts much streaked with brown distinguish the female and young.

Range: Breeds through much of Canada, south to the middle United States; winters in the United States, especially in the south.

Though not exclusively a marsh frequenter, as its name might seem to imply, this hawk prefers open country, and its favorite hunting grounds are meadow and marsh, in which it nests on the ground. It flies rather low, the better to see and drop suddenly upon the luckless meadow mice—its favorite food. Unfortunately small birds form part of its fare, and there are localities, like Cape Cod and Martha's Vineyard, in Massachusetts, where this hawk has earned a bad reputation as a destroyer of poultry and game. However, over much the larger part of the vast territory it inhabits, the marsh hawk is a rodent eater, and the debt of gratitude it lays upon the farmer is large. This debt should be fully discharged by preserving the bird and encouraging its presence unless it is caught committing overt acts. In other words, as this hawk is very beneficial over most of its range, individual hawks should be presumed to be innocent unless detected in transgression.

OSPREY (Pandion haliætus carolinensis).

Length, about 23 inches. The great size, brown upper parts and white under parts are distinguishing features.

Range: Breeds from northwestern Alaska, and central Canada south to the Gulf Coast, western Mexico and Lower California; winters from the southern United States, Lower California and Mexico to Central America.

A thin, high pitched whistle, the alarm as well as the call note of the osprey, frequently directs the attention of the passer by to this fine hawk as he circles high in air on the watch for fish. The bird is common along our coast and to some extent along our rivers, and his bulky nest of twigs, often in low trees or sometimes on the ground, frequently attests his former presence when he is wintering elsewhere. When unmolested, ospreys return to their own strip of territory year after year, and they and their descendants probably rear their young in the same nest for generations, repairing it from season to season as necessity requires. The osprey lives solely on fish which he catches himself—he disdains carrion—diving from mid air upon his quarry and often burying himself in the water momentarily by the force of his descent. He often fastens his talons in the back of a large fish, which proves too heavy, and he has to abandon it; but usually he succeeds in carrying his prey to his nest, though his slow and labored wing-beats often prove how heavy is his load. Notwithstanding the fact that the osprey makes no direct return for the fish he eats, no one can doubt that indirectly he renders a full equivalent. Visitors to the seashore, and even old residents, never tire of watching his superb flight and interesting habits, and his plunge, after his quarry, whether successful or unsuccessful, is a sight to be remembered.

TURKEY BUZZARD (Cathartes aura septentrionalis).

Length, about 30 inches. The naked head and neck and glossy black plumage are distinctive.

Range: Extends from southwestern Canada, northern Minnesota, southern New York and south into northern Mexico and Lower California.

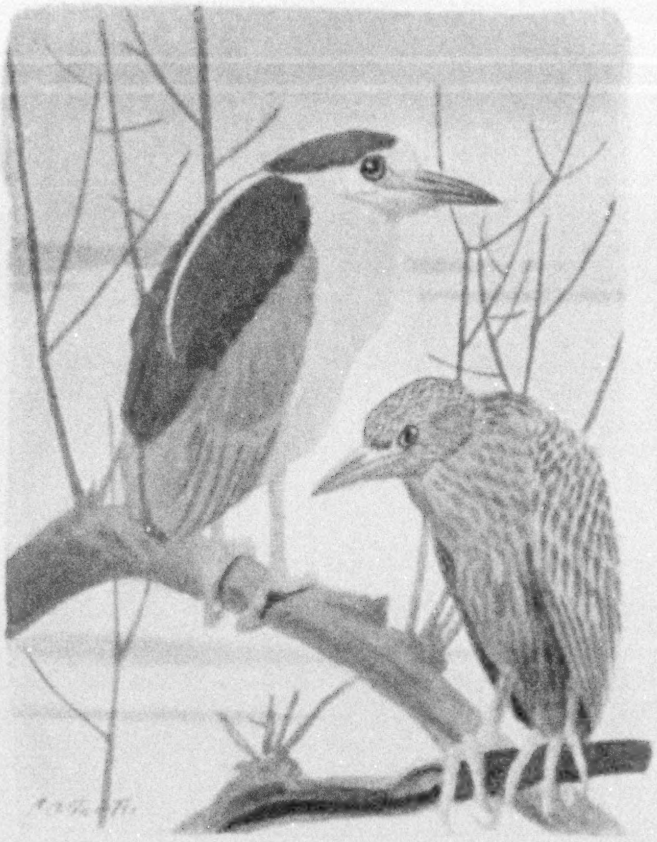
This buzzard displays superb powers of flight which even the eagle cannot surpass, and no small part of its time is spent in the upper air, describing great circles on motionless wings as if for the mere pleasure of flight. Let another buzzard, however, discover a carcass, and the movements of our æronaut as he hastens to the feast are at once noted by his next neighbor, and his by a third, till the carrion feeders of a wide territory are assembled. Sight and not smell, then, is depended on by the buzzard to guide him to his food. Though of great strength and provided with a formidable bill, the buzzard rarely, if ever, attacks living animals, unless they are disabled, but depends upon death to provide for his wants. No doubt his ability to fast is as great as his capacity for gorging himself when occasion offers, and he must often go for days without food. As a scavenger the buzzard does good service and no sound reason exists for destroying him, notwithstanding the fact that occasionally the bird may be instrumental in spreading hog cholera by transporting the germs on his feet and bill. This disease, however, may be, and no doubt often is, transmitted by the feet of so many other birds, especially the English sparrow, and of so many mammals, especially rats, and even on the footwear of man himself as to lead to the belief that if every buzzard in the hog cholera districts were to be sacrificed no perceptible diminution of the disease would follow. The bird should continue to enjoy the protection which is at present accorded it in nearly every state of the Union.

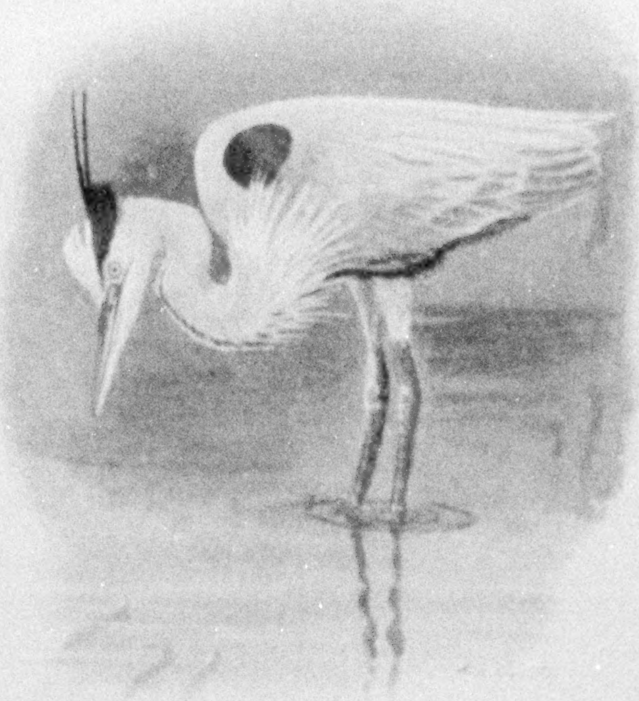
BALD EAGLE (Haliætus leucocephalus and sub-species).

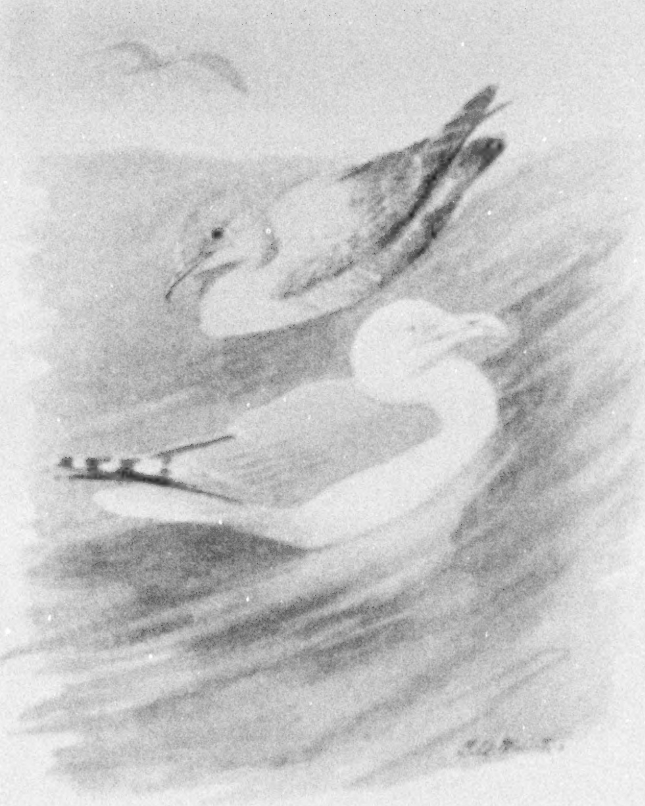
Length, about 33 inches. The white head (adult) and naked tarsus distinguish this species from the golden eagle.

Range: A resident of Alaska, much of Canada, and the whole of the United States in suitable localities.

Though a fisherman by profession, the white head is by no means the master of his craft that the osprey is. In fact he never fishes for himself so long as he can rob the more skilful and more industrious fish hawk. When necessity compels, however, he fishes to some purpose, and much after the manner of his erstwhile victim, the fish hawk. He is far less fastidious in his food habits than that bird, however, and often gorges himself until he cannot fly on dead fish gathered along shore, especially on the great salmon rivers of the northwest. When fish are scarce and waterfowl are plentiful, the white head has little difficulty in living off them. Complaint is made in Alaska, where the bald eagle is numerous, that he sometimes interferes with blue fox farming by killing the animals for food. Though the blue fox is not a large animal he is by no means a pigmy, and the bird who would make him his quarry must needs possess both strength and determination. As this eagle has been taken for our National emblem it would seem to be the part of patriotism to condone his faults and remember only his virtues, among which are a magnificent presence, superb powers of flight, and his devoted care of his family.







BLACK-CROWNED NIGHT HERON
Male, upper; young bird, lower
HERRING GULL
Adult in winter, upper
Adult in summer, lower

GREAT BLUE HERON
COMMON TERN

XUM

BLACK-CROWNED NIGHT HERON (Nycticorax nævius nævius).

Length, about 24 inches. The black crown distinguishes it from its relative, the yellow-crowned night heron.

Range: Breeds from northern Oregon, southern Wyoming, southern Manitoba, and central Quebec south to Patagonia; winters from northern California and Gulf States southward.

Given for a roosting place a suitable stand of leafy trees, especially evergreens, conveniently near a stream or pond that harbors fish, frogs and tadpoles, and any locality may have its colony of night herons. As its name implies, this heron is a bird of the night, not leaving its roost till dusk when, with frequent iteration of its hoarse quawk, it wings its way in the gathering gloom straight to its feeding place. So rarely is the bird about in daylight that a large colony may exist for years near a town or large city, and not above a dozen individuals have an inkling of its existence. True to its sociable instincts, the night heron by preference nests in colonies, and several pairs often place their rude nests of sticks in the same tree; or, in the absence of trees, as in the extensive tule swamps of the far west, where other conditions are ideal for herons, they nest on the ground or on the prostrate tules, hundreds of pairs being associated together.

This heron sometimes feeds on field mice, but it eats too many fish to please the fishculturist, and after it has once learned the way to a hatchery strong measures are needed to discourage its activities.

HERRING GULL (Larus argentatus).

Length, about 24 inches. Deep pearl gray above; much of rest of plumage white. Not readily distinguished in life from its allies.

Range: Breeds in Alaska and in Arctic regions south to southern British Columbia, southern Alberta, northern North Dakota, central Wisconsin southern Ontario, northern New York, and Maine; winters from southern British Columbia to Lower California and western Mexico, and from Gulf of St. Lawrence and Great Lakes south to Bahamas, Yucatan, and coast of Texas.

All things considered, the herring gull is probably the best known of the family by reason of its abundance and wide distribution. Moreover, this is the gull most frequently noticed by passengers as it follows in the wake of our ocean and trans-Atlantic steamers. It breeds no farther south than the coast of Maine, but in winter it is very numerous along the Atlantic coast and in many of our inland ponds. It does excellent service as a scavenger in our harbors, venturing fearlessly among the shipping to secure anything edible that may find its way overboard. The services of this and other gulls in such a capacity are so valuable that their destruction under any pretense is to be deprecated. When the craze for feathered hat gear was at its height thousands of gulls, without regard to species, were killed for millinery purposes, but it is to be hoped that, now the sale of their feathers is illegal practically everywhere in the United States, the gulls will rapidly increase.

(See Biol. Surv. Bul. 17, pp. 53, 80.)

GREAT BLUE HERON (Ardea herodias and sub-species)

Length, from 42 to 50 inches.

Range: Breeds from the southern Canadian provinces south to southern Lower California, southern Mexico and South Atlantic States; winters from Oregon, the Ohio Valley and Middle States south to the West Indies, Panama and Venezuela.

When one sees a large bluish bird, with long neck and stilt-like legs, standing motionless by river, pond or lake, or slowly wading in the shallows, he may be sure he has before him the great blue heron, and a notable bird he is in many ways. Wary as this heron is and keen to scent danger, he offers so tempting a mark as he wings his way slowly along, with head and neck drawn in against the body and long legs trailing behind, or as he stands motionless watching for game, that he is frequently shot "just for the fun of it." This wanton taking of life is never justifiable, but when the life cut short represents so much beauty and grace as are embodied in this stately bird, the crime seems doubly heinous. Naturally this heron is much less common than he used to be.

Small fish, frogs, tadpoles, and snakes form the bulk of his food, and in some regions he is a determined foe of mice and gophers, and the sight of a heron in the midst of a dry pasture or in a stubble field watching for a gopher to emerge from his hole is very common.

(See Biol. Surv. Bul. 31, p. 52; also Bul. 17, p. 217.)

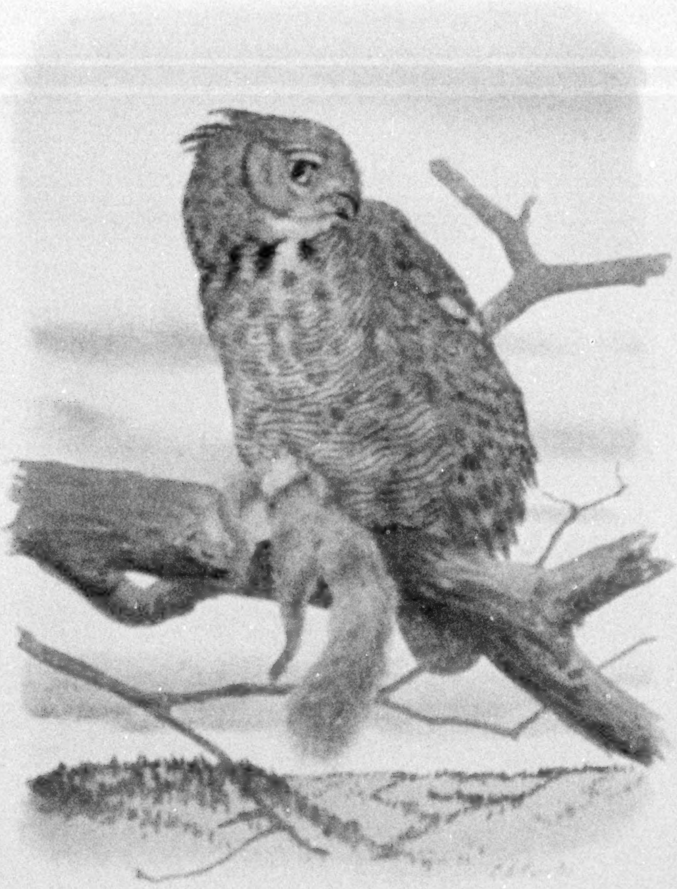
COMMON TERN (Sterna hirundo).

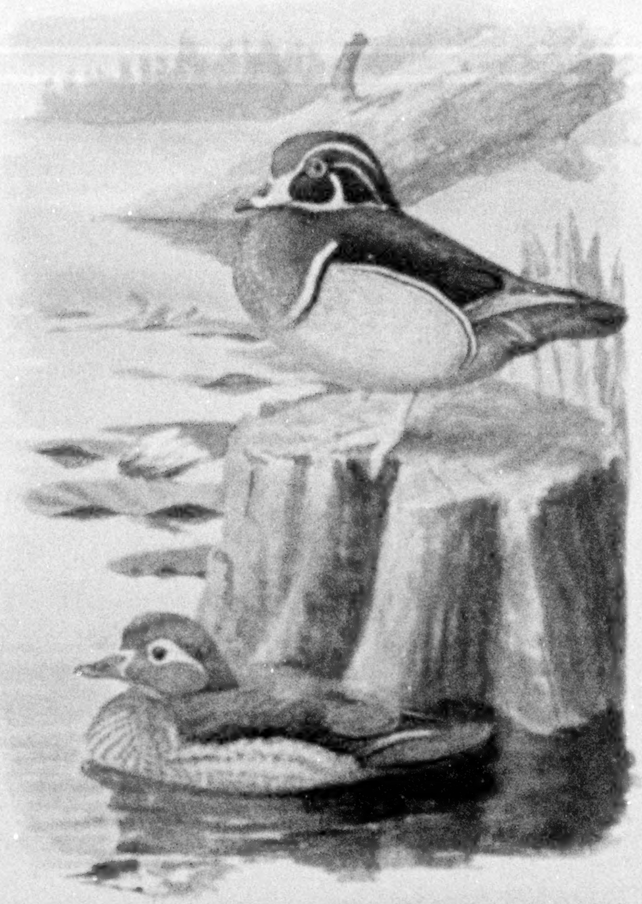
Length, about 15 inches. The pearl-gray breast and belly distinguish the adult of this tern from its relatives. The outer web of the outer tail feathers is darker than the inner web; the reverse is true of Forster's Tern, its nearest ally.

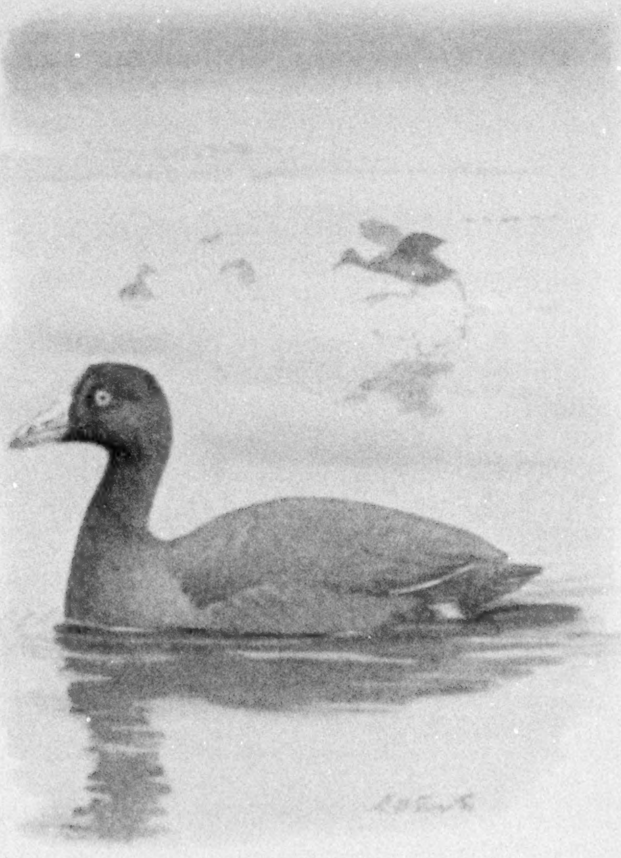
Range: Breeds from Great Slave Lake, central Keewatin and southern Quebec south to southwestern Saskatchewan, northern North Dakota, southern Wisconsin, northern Ohio and North Carolina; winters from Florida to Brazil.

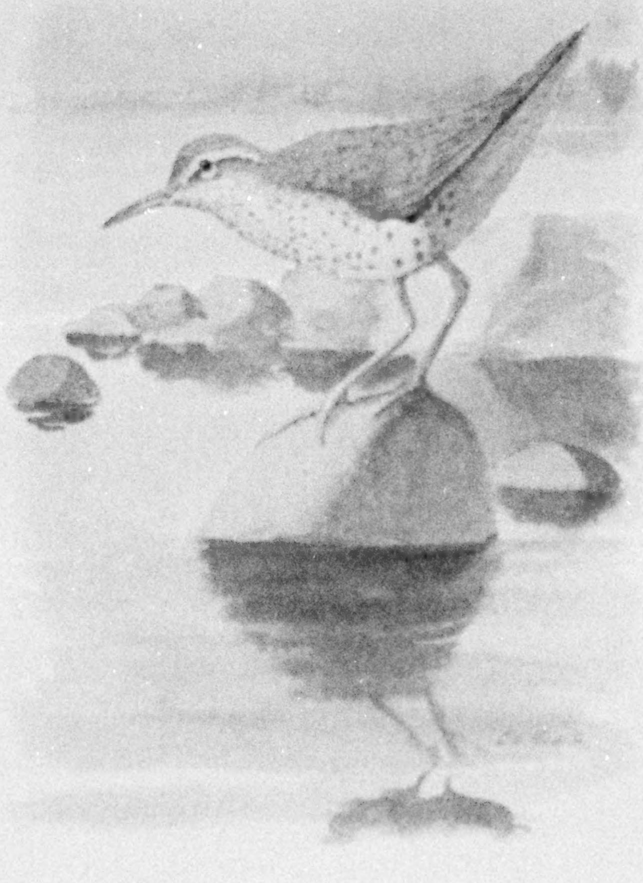
Our common tern is, alas, common no longer. The Atlantic coast is peculiarly fitted to be the home of the terns by reason of the extensive shallows and the great number of sandy islands on which terns and gulls used to breed in absolute safety. At the bidding of fashion, however, thousands of these beautiful creatures were slaughtered till the sand was red with their blood and island colonies that used to number thousands were exterminated. No excuse serves to palliate the crime of the wholesale murder of these graceful sea swallows, as they are aptly termed, which used to make our shores so attractive by their presence. But the tide seems to have turned, partly at least. The Government has set aside islands as breeding resorts and places of refuge and, through the activity of Audubon Societies and of individual workers, a certain measure of safety seems now assured to these persecuted birds. It may even prove possible, by the bird sanctuary plan, to increase their numbers again and make them a familiar sight along our deserted shores. Could the sentiment of the women of the United States be united for their protection, all doubt as to the future of these beautiful creatures would be removed, but so long as the arbiter of Fashion decrees feathers on hats, so long will the eternal vigilance of their friends be needed to assure the safety of the small remnant of this species and its kindred.

XUM









Great Horned Owl
Coot

Wood Duck
Male, upper; female, lower
Spotted Sandpiper

GREAT HORNED OWL (Bubo virginianus and sub-species).

Length, about 22 inches. The great size and long ear tufts sufficiently distinguish this owl.

Range: Resident over the greater part of North and South America.

This, our largest owl, inhabits heavily forested and unsettled regions and is becoming more and more rare in thickly populated areas. It is well known by its far reaching call—"hoo-hoo-hoo-hoo"—which is heard best in the still small hours of the night, when it echoes across the expanse of canyon and forest in the far west.

This owl destroys many partridges and other game birds, and unhoused poultry is never safe from its nocturnal attacks. Its deeds are those of darkness, since usually it hunts only at night, though when disturbed in the daytime it can see well enough to take good care of itself. Its bill of fare is a long one and includes many kinds of mammals and birds. It is one of the few creatures which when hungry do not hesitate to attack the skunk, and it appears to have no great difficulty in killing this rather formidable little beast. That it does not always do so with entire impunity is evident from the odor frequently attaching to its feathers. Its destruction of rodents entitles it to our gratitude, especially when it kills pocket gophers, rats, mice, ground squirrels and rabbits. In some parts of the west rabbits are responsible for much damage to orchards and crops and consequently their reduction is a blessing. Nevertheless the protection of this big and fierce owl cannot be recommended on sound economic grounds.

COOT (Fulica americana).

Length, about 15 inches. The slate-colored plumage, with blackish head and neck, white bill, and scalloped toes mark this bird apart from all others.

Range: Breeds from southern Canada south to Lower California, Texas, Tennessee and New Jersey; also in southern Mexico and Guatemala; winters from southern British Columbia, Nevada, Utah, Ohio Valley and Virginia south to Panama.

The coot, or mud-hen, is a sort of combination of duck, gallinule and rail, and withal is a very interesting bird. Fortunately for the coot, its flesh is little esteemed, and by many, indeed, is considered unfit for human consumption. The coot is thus passed by in contempt by most sportsmen, and in some regions it is as tame as can well be imagined, swimming within a few feet of the observer with entire unconcern. Under other circumstances, however, as in Louisiana, where it is shot for food under the name *poule d'eau*, it becomes as wild as the most wary of ducks. It frequents both salt and fresh water, preferably the latter. The mud-hen is one of the few American birds that occasionally visits the distant Hawaiian Islands in fall and winter. Finding conditions there to their liking, some of the immigrants, probably centuries ago, elected to remain and found a new colony, and there, in the fresh water ponds of the island archipelago, their descendants still live and thrive.

The food of the coot consists almost entirely of water plants of no use to man. There would seem, therefore, to be no excuse for killing or disturbing the bird in any way.

WOOD DUCK (Aix sponsa).

Length, about 19 inches. The elongated crest of feathers and variegated plumage of white and brown, spotted with chestnut, ochraceous and steel blue are characteristic.

Range: Breeds from Washington to middle California, and from Manitoba and southeastern Canada to Texas and Florida; winters chiefly in the United States.

It can be said of this duck, as of no other, that it is our very own, since most of the breeding area it occupies is within our territory, and by far the greater number of the species winter within the United States. The story of its former abundance on our ponds and streams and of its present scarcity is a sad commentary on our improvidence and a warning for the future. Happily, it is not yet too late to save this most beautiful of our ducks, and under proper regulations it may be expected not only to hold its own, but to increase until it is once more a proper object for the skill of sportsmen. Under present conditions all true sportsmen should refrain from its further pursuit.

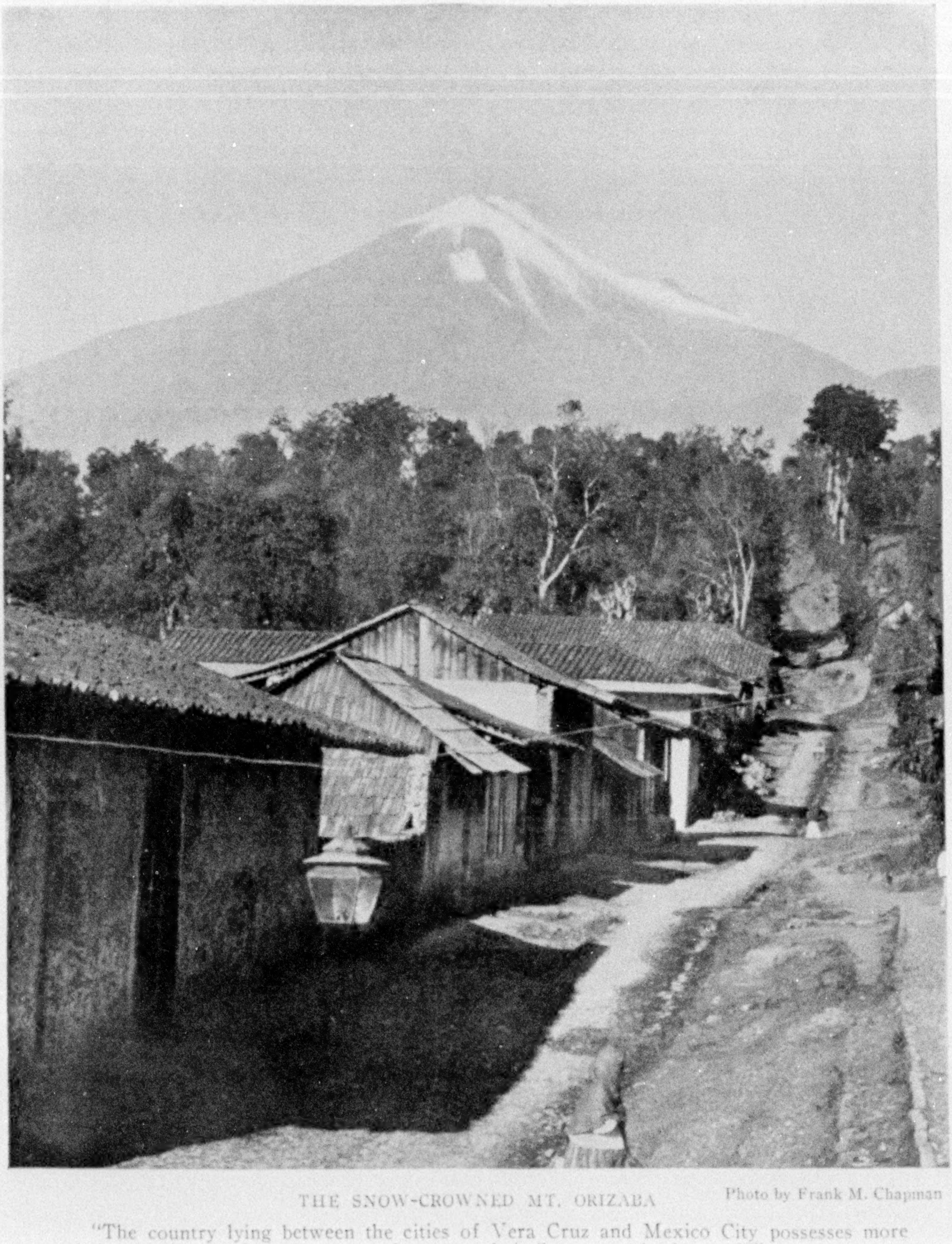
As is well known, the wood duck is one of the few wildfowl that builds its nest in hollow trees, and the security thus provided for the young is one of the factors to be relied upon for the increase of the species. North, south, east and west, the States of every section are, or should be, interested in the preservation of this distinctively American duck, and should make suitable regulations for its welfare and see to their enforcement.

SPOTTED SANDPIPER (Actitis macularia).

Length, about 6 inches. The "tip up," with its brownish gray upper parts and white under parts and its teetering motion, is too well known to need description.

Range: Breeds in northwestern Alaska and in much of northern Canada south to southern California, Arizona, southern Texas, southern Louisiana and northern South Carolina; winters from California, Louisiana and South Carolina to southern Brazil and Peru.

The little "tip up," as it is appropriately named, from its quaint nodding motion, unduly favors no one section or community but elects to dwell in every region suited to its needs from Alaska to Florida. It is doubtless more widely known than any other of our shore birds, and as it takes wing when disturbed, its "wit, wit" comes to us from beach, river side, and mill pond, from one end of the land to the other. It is the only shore bird that habitually nests in cornfields and pastures, and its handsome buff eggs spotted with chocolate are well known to the farmer's boy everywhere. Much is to be said in favor of the food habits of the little tip up, as the bird includes in its diet army worms, squash bugs, cabbage worms, grasshoppers, green flies and crayfishes. Having thus earned a right to be numbered among the farmers' friends, the bird should be exempt from persecution. The tiny morsel of flesh afforded by its plump little body, when the bird has been shot, is in no sense an adequate return for its services when alive and active in our behalf.



THE SNOW-CROWNED MT. ORIZABA

Photo by Frank M. Chapman

"The country lying between the cities of Vera Cruz and Mexico City possesses more varied natural attractions than any other area of similar extent in the world" (see text, page 533). "The summit of Orizaba can be reached without great difficulty. One may travel to an altitude of 15,000 feet by mule, and the remaining 3,000 odd feet are traversed on foot. No physical obstacles are encountered, and the walk to the top is merely a matter of legs, lungs, and heart" (see text, page 548).

A NATURALIST'S JOURNEY AROUND VERA CRUZ AND TAMPICO

By Frank M. Chapman

Curator of Ornithology in the American Museum of Natural History

With Photographs by the Author

WHILE fully aware of the high percentage of error most sweeping assertions contain, I nevertheless venture to claim that the country lying between the cities of Vera Cruz and Mexico City possesses more varied natural attractions than any other area of similar extent in the world.

From the moment when, on the Gulf, one sights the still distant Sierra, until one reaches the site of Tenochtitlan itself, one's attention is held by a variety of interests which make the trip from coast to table-land, and the snow-peaks rising from it, an epitome of a journey from equatorial to boreal regions.

If one is in search of supremely beautiful scenery, it is here to and beyond the limit of human appreciation. If one would test the climates of the world, he may go in a day from perpetual summer to everlasting snow, and at the same time pass from belts where rain falls almost daily to others where it is rarely known. With these extremes of temperature and humidity there is, of course, a corresponding diversity in flora and fauna, which makes the region of exceptional interest to the botanist and zoölogist, and particularly, as I shall endeavor shortly to show, to the student of the distribution of life.

For the archeologist there are ruins which evince a high degree of aboriginal culture; and for the ethnologist, natives who, in retaining their tribal customs, offer problems of fundamental importance in connecting the present with the past.

The historic period opens with the incomparable romance of Cortez and Montezuma, of Aztecan and Tlaxcalan, and passes through three centuries of Spanish government, the war of independence, the short-lived empire of Maximilian, and the campaign of Scott, to the astonishing era of material development under Diaz, and the no less disastrous years of disintegration once his iron grip was loosened.

Thus, omitting all reference to natural resources and commercial possibilities, whether one be a student of nature or of man, or merely a tourist in search of the novel and beautiful, this portion of Mexico will appeal to him with a force and fascination which makes a journey through it one of the memorable experiences in a lifetime of travel.

ENTER FROM THE GULF

Be one student or tourist, there can be no question that one should enter Mexico from the Gulf. Were it not for customs-house formalities, the northern boundary might be crossed unawares at many points; but to follow for days in the wake of the Conquistadores produces a mental condition which prepares one properly to enjoy a definite arrival in Mexico near the landfall of Cortez. A journey from the coast to the capital follows a natural succession of climatic zones as well as the sequence of early historic events.

Furthermore, steamers so arrange their schedules that they reach Vera Cruz in the morning, and we begin our day, therefore, alert and eager for the experiences incident to travel in a land where the eye is greeted by strange sights, the ear by unfamiliar sounds.

The day, indeed, should begin at sunrise, some hours before disembarking at Vera Cruz, with a hope that one may have the rare good fortune to see the first rays of the sun touch the summit of Mt. Orizaba, the first, as it will be among the most lasting, of one's impressions of

XUM

Mexico. The shore is still some 30 miles distant, the mountain itself about 100 miles, and one is with difficulty convinced that the gleaming pink cloud high above the horizon is part of the still invisible earth beneath it. Doubtless the Aztecs were not familiar with this view of Mt. Orizaba, but from no other place is their name for it—Citlaltapetl, the Star Mountain—so applicable.

On only one of three voyages to Mexico have I had this thrilling view of Orizaba's snow-crown, but in default of it there is still the sunrise over the Gulf, and if this be obscured, there is always the Gulf itself, usually calm at this hour, and the half-speed at which the steamer is moving to prevent too early an arrival at Vera Cruz, gives one an exceptional opportunity to see the surface life from her deck.

SCHOOLS OF FLYING FISH

Nearly every little raft of gulf-weed shelters a swarm of small fish; near the Arcos keys the black and white gannets, which evidently live there, are abundant, and occasional herring gulls, sooty or bridled terns, and frigate birds are seen, while at frequent intervals flying fish, flushed by the steamer, spring from beneath the bow and scale away. One exceptionally calm morning, when the Gulf was glassy smooth, we could see them from the bow of our ship, swimming ahead a foot or two beneath the surface.

As the steamer bore down on them they darted right and left, or at our too close approach took to the air. For 20 to 40 feet they touched the surface when the tail and long, wing-like pectoral fins were in rapid motion, the latter being moved up and down. The body was held at an angle and apparently only the lower lobe of the tail touched the water, making, when it struck, a series of connected circles. Sufficient headway being thus gained, the fins became rigid and the creature scaled or sailed, a true aëroplane, until momentum was lost, when it plunged abruptly into the water. When the tail struck the crest of a swell the "wings" also vibrated, and fresh force was thus acquired, but the calmness of the sea afforded few opportunities for this method of prolonging the sail. This varied from a few feet to 150 yards, with frequent changes of direction.

March 4, 1910, as the steamer passed the island fortress of San Juan de Ulloa and glided inside the breakwater to the substantial customs pier, our preparations for immediate landing were halted by the tardiness of the health officer, who, after keeping us impatiently waiting for an hour, conducted his inspection with exasperating deliberation; nor were we declared free until the last steerage passenger had been examined.

CONQUERING PEACEFUL BANDITS

In the meantime, on the pier below, a horde of *cargadors* had gathered behind the rope before which the baggage had been piled. As we descended the gangway the rope was dropped, and we were charged by a mob of shouting, gesticulating porters, five or six of whom shoved their badges into one's face at the same moment, grabbed our hand baggage, and all but tore us into fragments. It was a scene of riotous confusion, with two or three score bandits pulling, shoving, swearing, dodging, fighting for the privilege of taking our luggage to hotel or railway station, and I emerged from the fray with all our 14 trunks, 14 valises, and the exultation of a conqueror.

Time was when Vera Cruz was dreaded as a pest-hole, and trains at once took one from the steamer up the Sierra on the way to Mexico City, usually as far as Orizaba. Now, however, sanitary conditions and hotel accommodations have been so improved that one may stay here without danger or discomfort. At least, one should remain over night to begin the trip toward the table-land early in the morning, and thus be able to see every foot of this remarkable journey.

Fellow-travelers with whom we had shared a common interest in the events of the voyage now separated, each to his appointed task or tour. A newly appointed ambassador went to his post at the capital with small realization that out of the apparently peaceful present would soon arise a period of devastation ruinous to the interests of the country and presenting critical situations for diplomatic

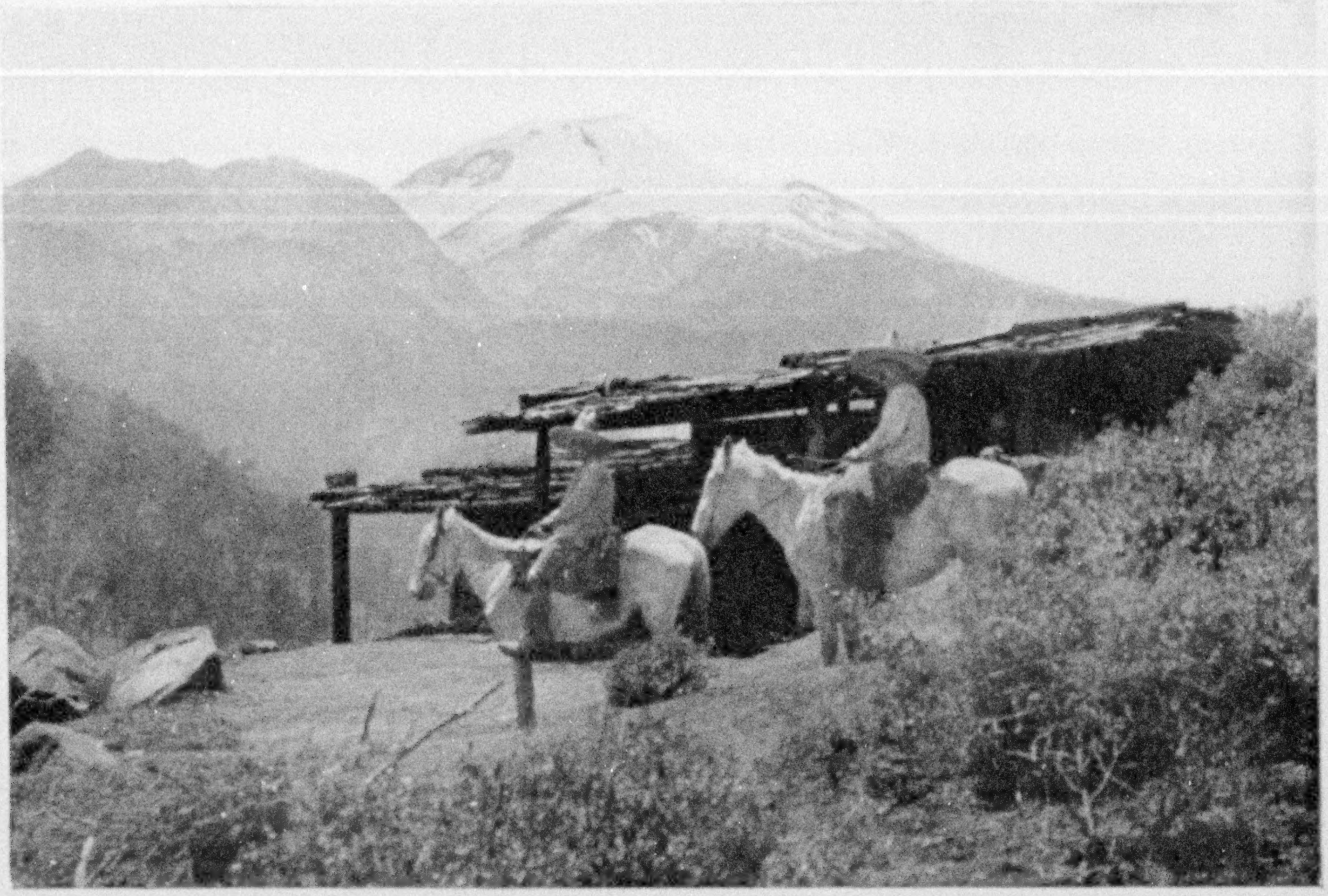


Photo by Frank M. Chapman

A VIEW OF MT. ORIZABA FROM THE TRAIL, AT 9,500 FEET

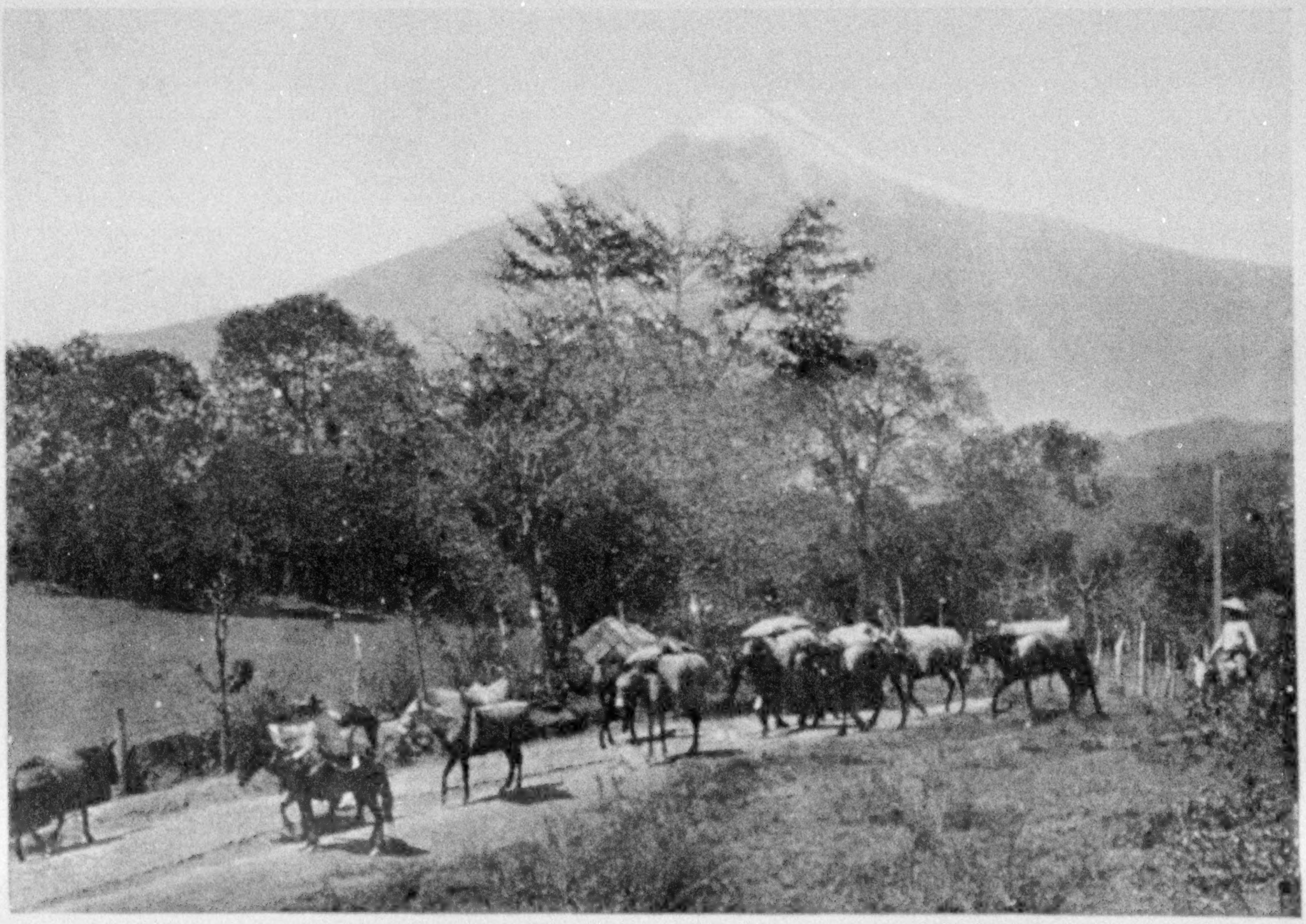


Photo by Frank M. Chapman

MULES LOADED WITH COFFEE; MT. ORIZABA IN THE DISTANCE

XUM

RIVER FRONT OF TAMPICO, MEXICO Photo by Frank M. Chapman

treatment; a rubber planter went south to the Isthmus, an oil-man north to the petroleum deposits near Tuxpam, and an archeologist left for the ruins on the table-land.

Some came to buy, others to sell, and in more settled lands we might have had small interest in them or their calling, but your commercial man in the tropics is often an adventurer at heart and an explorer in practice, and if his reports to his "house" never reach the pages of a geographic magazine, we may admit that they not infrequently contain more novel information than many reports that do. Gratefully do I acknowledge my debt to these Knights of Trade, whose intimate knowledge of little-known trails and places has been of no small value in solving problems of transportation and subsistence.

WE PASS THROUGH TROPICAL, TEMPERATE, AND BOREAL ZONES IN 75 MILES

My own mission in Mexico was to make field studies and collect specimens and accessories for an American Museum Habitat Group, designed to illustrate the effect of altitude on the distribution of life; and the fact that nowhere on the American hemisphere can this be done so effectively as in the country lying between sea-level and snow-line on Mt. Orizaba, is in direct support of the claims made for the diverse interests of this truly wonderful region.

Reference to a map of the natural life areas of North America shows the tropic region stretching up two narrow arms on the Gulf and Pacific coasts of Mexico which, in places on the higher Sierras, are paralleled by southern extensions of the Canadian Zone of the north. Between the two lie bands of the Temperate Zone.

Thus, in our journey from the Gulf to the summit of the Sierra, we pass through Tropical, Temperate, and Boreal zones—the Tierras Caliente, Templada, and Fria, of the native. Our actual journey, in passing from sea-level to snow-line, may be a matter of 75 miles, our change of altitude approximately three miles; but if we were to seek the Canadian Zone not on mountain top but on the coast, it would be necessary for us to travel to Maine or Nova Scotia. In other words, a journey of some 1,500 miles would be required to reach conditions which are here distant but three altitudinal miles.

Photo by Frank M. Chapman

A "FIG" TREE ON THE TAMESI RIVER, MEXICO

FROM PARROTS TO CROSSBILLS

It follows, then, that one can actually stand in a tropical jungle, where parrots, trogons, toucans, and other equatorial birds are calling from the liana-draped trees, and look upward to forests of pines and spruce, where crossbills, juncos, pine siskins, and evening grosbeaks are among the common permanently resident species.

Later, we may ascend to the snows on Orizaba to discover at approximately what altitude the palms of the Tierra Caliente give way to the oaks of the Tierra Templada, to be in turn replaced by the spruces of the Tierra Fria. As a preliminary to this journey let us first see something of the Tropical Zone.*

Circumstances led me to make studies in this zone near Tampico, and from this town of many dugouts we embarked at 6.15 on an April morning, bound for Paso del Haba, a small sugar plantation on the banks of the Tamesi River distant 75 miles by water, 35 by land. In addition to our host, who proved a host indeed, our party consisted of George Shiras, 3d, Louis Agassiz Fuertes, Chapman Grant, and the writer—a company with sufficiently diverse aims to insure a many-pointed contact with nature.

Sacrificing the picturesque to the practical, we embarked in a launch with a four-horse-power engine, rather than a tolda-covered canoe of four-paddle power, and consequently reached our destination in twelve hours rather than in thirty-six. But what we gained in speed we lost in opportunity for observation.

ENCROACHING CIVILIZATION

An intrusively vulgar, tuff-tuffing motor-boat is about the most effective agent for destroying the charm and alarming the life of a quiet, remote tropical river that man has devised; but we argued that opportunities missed on the water might

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*As a matter of fact, on this particular trip, the tropics were visited last, but the narrative follows the more natural order.

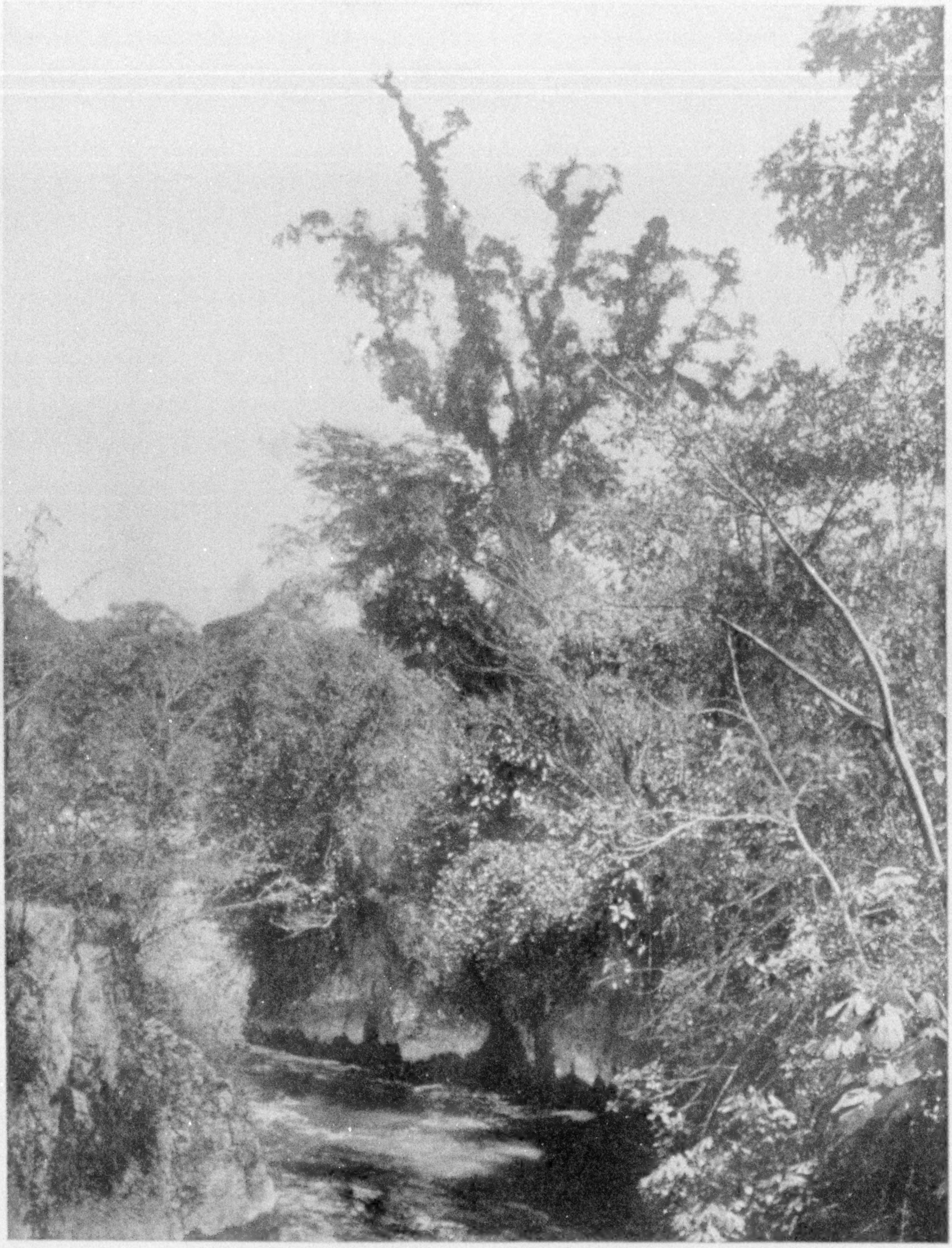

Photo by Frank M. Chapman

A TREE LOADED WITH PARASITES

"In our journey from the Gulf to the summit of the Sierra we passed through Temperate, Tropical, and Boreal zones. . . . To reach conditions which are here distant but three altitudinal miles we should have to make a journey of some 1,500 miles" (see text, page 536).

Photo by Frank M. Chapman

PARASITE VEGETATION ON LIMB OF A TREE

be found on the shore. Furthermore, on the lagoons which mark the entrance of the Tamesi into Panuco, the birds seemed to have become in a measure accustomed to the steady, even cough of our kind of craft, and we passed within gunshot of numerous coots, many species of ducks, and even a small flock of roseate spoonbills, a bird with which we hoped to become more familiar later.

Soon the Tamesi narrowed to 150 or 200 feet, a width it held with surprisingly little variation throughout the day. For a time it wound through a grazing country, which is overflowed in the rainy season, where cattle were numerous and trees almost wanting; then for miles we passed through plantations of bananas. This moisture-loving plant can be grown here only in the narrow strip formerly occupied by the original forest on the banks of the river. With the forest had gone most of the wild life; but man himself was here sufficiently primitive to be a part of the fauna, and his picturesque thatched cabins and log-hewn canoes, and the passing glimpses of his way of life on land and water, afforded interesting illustrations of the manner in which he meets his environment.

About 60 miles from Tampico we first encountered primeval forest, which in this low, comparatively arid coastal zone is restricted to the river banks, and the immediate increase in the number and variety of birds seen, stimulated a somewhat flagging faith in the accuracy of statements concerning the bird life about the plantation which, be it confessed, we had received with more or less incredulity.

It was 5.30 when we arrived, with just enough daylight left to pitch our tents in the ranch-house clearing on the banks of the river. The brown stream flowed silently by some 20 feet below us, with no hint of the loss to life and property it had caused only the preceding season, when it flooded the country for miles.

It is commonly believed that to see

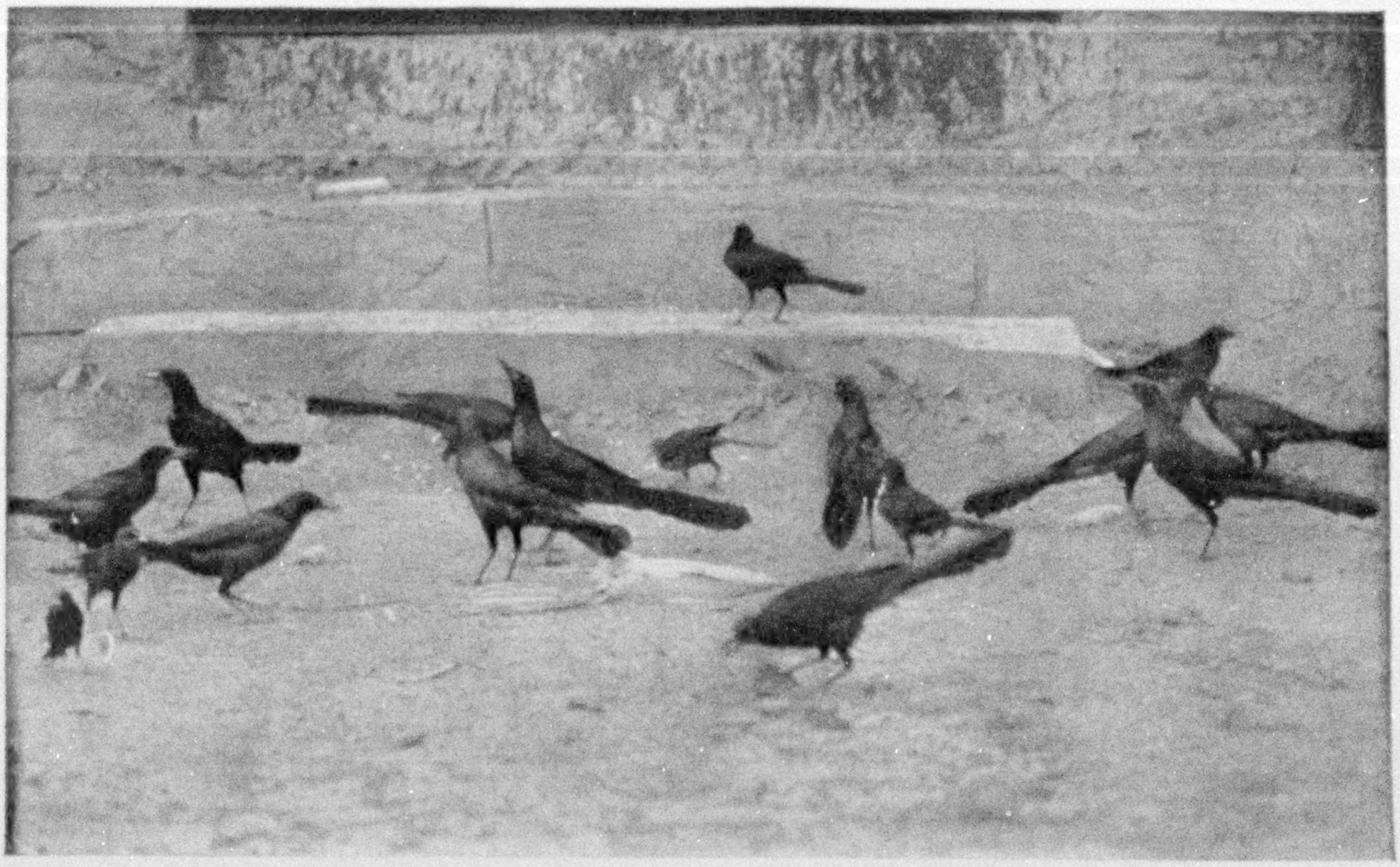

Photo by Frank M. Chapman

GREAT-TAILED GRACKLES, NEAR VERA CRUZ, MEXICO

tropical birds in abundance one must go at least to South America; but I have yet to find, in a somewhat extended experience, any place where certain eminently characteristic tropical species are more abundant than we found them at this camp on the Tamesi River distant less than four days from Chicago!

A BIRDLAND BABEL

We were awakened by the loud calls of flying parrots, not passing over at a great height, *en route* to some distant feeding-ground, as one usually sees them, but stopping, with much conversational chatter, to join scores which were breakfasting in the trees overhanging our tents.

At once we recognized the "double yellow-head" (*Amazona oratrix*) of the bird stores, rated by dealers as second only to the gray, red-tailed African parrot in its power of speech, and second to none as a whistler. With it was a slightly smaller, red-capped parrot (*Amazona viridiginalis*), which, whatever it may be in a cage, is vocal enough in nature. Parrakeets of two species, with darting, dove-like flight, shot through the clearing, uttering their sharp, rolling cry, or, entering a tree-top, disappeared with incomprehensible completeness until, assured of the safety of their surroundings, they began slowly to move about in search of food.

Red-billed pigeons (*Columba flavirostris*) nearly as large as our domestic bird, shouted their emphatic "hurrah," and the dainty little scaled doves filled in the gaps with their quaint *put-a-coo, put-a-coo;* ground doves mourned gently, if inconsolably, and the pygmy owl (*Glaucidium*) whistled with clock-like regularity from the top of a leafless tree—a perch which this diurnal, light-loving midget prefers.

Great-tailed grackles creaked, sniffled, whistled, choked, and rattled; queer little Mexican crows, looking not much larger than blackbirds, perched in flocks in the leafless trees, snoring and grunting; flycatchers (*Myiozetetes texensis* and *Tyrannus melancholicus*) twittered excitedly; Derby flycatchers (*Pitangus*) cried *hip, hip, hurray;* gold and black orioles whistled like school-boys homeward bound; anis whined; golden-fronted woodpeckers coughed; and ever and again the big Mexican pileated woodpecker sprang his thumping, reverberating rattle with astonishing effect.

A DREAM COME TRUE

It was such a scene as one might well have dreamed of, but scarcely expect to find when waking; nor did it altogether fade with the rising sun. These birds were not only feeding, but living, near us, and when their early morning hunger was satisfied many of them were found to be nesting, or preparing to nest, within sight of our tent.

A ground dove sat calmly on her two white eggs in the heart of a small orange tree at the ranch-house door; a red-billed pigeon, for some reason dissatisfied with the site in which its nest was built, was moving it twig by twig to a new situation in a limb above our tent; a pair of pileated woodpeckers had taken possession of a dead trunk about 150 feet from camp, making the entrance to their nest directly beneath a large projecting fungus, which served as an admirable hood to their doorway; yellow-headed parrots were prospecting for a homestead in a dead tree on the river shore, and appeared and disappeared in its hollow limbs in a manner which seemed to indicate they felt at home; while a pair of red-capped parrots were evidently much annoyed to find that a cavity which appeared to be acceptable was already occupied by a lizard about 2 feet in length, who refused to be dislodged, but continued to bask quietly at his threshold with, no doubt, irritating calmness.

Three factors accounted for the abundance and familiarity of the birds about our camp in the ranch-house clearing: First, the larger forest trees had been left standing and only the undergrowth cut out; second, many of these trees, locally known as "otaheite," were bearing fruit of which parrots and some other birds were particularly fond; third, the birds were not molested.

To see the species which required either undergrowth or wholly primeval conditions, it was necessary only to climb the corral fence, 200 yards away, and enter the forest on its farther side. The trees were not high, but the growth was dense, and in places the ground was covered with wild pines having leaves bordered by a series of strong hooks, which, set in both directions, were more productive of eloquence than progress when one attempted to leave the forest path.

BOLD AND TIMID BIRDS

Here, if one could avoid the big brown jays (*Psilorhinus*), which, with jerky flight and raucous calls, followed one with maddening persistence, he might find the copper-tailed trogon and hear its flicker-like *coo* or detect the elusive, echo-like *hoot* of the mot-mot; and in the early morning the air vibrated with the soft, conch-like cooing of the semi-terrestrial white-fronted dove (*Leptotilla*), while chachalaccas rattled, woodhewers (*Dendrornis*) piped, wrens of several species called or sang from the lower growth, and overhead there were warblers, tanagers, and vireos, some on their way north, others preparing to nest.

The banks of the river were too high and too continuously wooded to be suitable for water-loving birds, and the river is memorable to us chiefly as a fly-way of the splendid Muscovy duck, wild ancestor of a much degraded barn-yard descendant.

No one lacked for occupation at Paso del Haba. Shiras hunted with camera by sunlight and flashlight, securing photographs of birds by day and of beasts by night, and left, no doubt, a more vivid and lasting impression on the minds of two natives who unwittingly sprang one of his flashlight camera-traps than even his dry plate recorded.*

The naturalists added to their store of notes and specimens, while the keen, discriminating ear of Fuertes led to the discovery of a surprising new species of oriole, possibly the ancestral form of our familiar orchard oriole.

ORNITHOLOGIST'S PARADISE

Given the same considerate host who made our stay at his home so care-free, and hence productive as well as enjoyable, and somewhat more stable governmental conditions than have lately prevailed in this vicinity, and I know of no place where an ornithologist might hope to learn more of the habits of many tropical species concerning whose home lives we know as yet little or nothing. Of the 88 species recorded by us during the week of our stay, no less than 36 are tropical forms, which are here at, or near, the northern limit of their range.

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* See the article by Mr. Shiras in NATIONAL GEOGRAPHIC MAGAZINE, July, 1913, "Wild animals that took their own pictures by day and by night," page 807.

This fact in distribution, together with the specimens to confirm it, filled our present wants, and we returned to Tampico to continue our reconnaissance in the tropical fauna among the water birds of the Tamiahua lagoon to the southward.

A canal which had lately been completed from the Panuco River to the northern end of the Tamiahua lagoon gave easy access to that large body of water. Having now to supply our own launch, several days were lost in overcoming the numberless obstacles which invariably confront the hurried traveler in the tropics, but the importance of actually starting induced us to leave Tampico at 3.30 in the afternoon of April 11 rather than wait until the following morning.

Sunset found us still in the canal and we were forced to camp for the night on the lately erected mud-bank which formed its shores—a site fully demonstrating the importance of a tent with a permanently attached water-proof floorcloth. There were a few ducks in the bordering mangrove swamps. Fuertes killed three blue-winged teal soon after we landed, and a pair of gadwalls, which took wing as he fired, were dropped, if not literally in our pot, at least in the fireplace.

The spot was a good one to leave, and we were off early in the morning on our run to the southern end of the lagoon. Great brown rail (*Aramides*), Muscovy ducks, and black-necked stilts were among the noteworthy birds about us, while an astonishing number of coots (*Fulica*) were found resting on the long jetty-like arms which carry the canal to deep water in the lagoon. With explosive, protesting *cucks* they pushed off into the water, forming, finally, a solid black raft seemingly several acres in extent. Along the shore there were a few canvasback, gadwall, and shovelers; but most of the ducks had evidently left for the north, and birds as a whole were far from common.

With anticipations of better things beyond, we puffed along as rapidly as a head wind and two towed row-boats laden with gasoline, provisions, and camp equipment would permit. Our objective point was the home of a certain Indian hunter whom Charles Sheldon had told me could give us all needed information about bird life in general and roseate spoonbills in particular; but it must be admitted that the fact I had forgotten the man's name and mislaid the notebook in which it was recorded rather clouded our immediate future.

However, when we landed on the eastern shore of the lagoon for the night we learned from a troop of small Indian boys, who gravely shook hands with each one of us as we stepped ashore, that a thatched hut on a near-by bluff was the home of the man we had been blindly seeking. "Maclodeo" was the name to which a dormant memory instantly responded.

A JUNGLE VISITING CARD

Maclodeo proved to be absent hunting alligators, but when, the following morning, I introduced myself to his wife as a friend of "el Americano Don Carlos" a flash of comprehension illumined her previously puzzled features, and hurrying into the dimness of her thatch she quickly returned with a small, still white and evidently precious bit of cardboard, on which was engraved "Charles Sheldon, Madison avenue, New York City," a treasured memento which completed the identification of Maclodeo!

Information now came readily, and we learned that not only spoonbills, but several other species of birds were nesting on a group of small islets about 10 miles farther south. In spite of our ardent desire to see these birds, our surroundings were too attractive to leave without at least a casual exploration.

The peninsula is here about 10 miles in width, and in place of a growth of acacias, cacti, and other xerophytic plants, such as characterize the coastal plain to the north and to the south, it is for the greater part covered with a forest of surprising luxuriance. The common occurrence of fresh water at a depth of not more than two feet indicates that

Photo by Frank M. Chapman

PELICANS IN BLACK MANGROVES IN TAMIAHUA LAGOON, MEXICO

this forest has appeared in response to a natural subsurface irrigation. However this may be, the fact remains that at this point luxuriant tropical forest growth reaches its northern limit at sea-level, a circumstance which implies that one may expect to find here many species of plants, birds, and mammals heretofore known only from farther south, as well possibly as some local forms.

AN UNEXPLORED REGION

The region is practically unexplored zoölogically, and offers an attractive as well as a readily accessible field to the faunal naturalist. Purely as a bit of pertinent information, it may be added that no one should attack it who is not proof against mosquitoes and the small ticks, locally known as "pinaleas."

A day near Maclodeo's added to our list of purely tropical species a third parrot, a tinamou (*Tinamus*), a great cacique (*Gymnostinops*), a hawk (*Rupornis*), a falcon (*Falco albigularis*), a toucan (*Ramphastos*), a flycatcher (*Megarhynchus*), blackbirds of the genera *Amblycercus* and *Dives*, tanagers of the genera *Saltator* and *Phœnicothraupis*, and flycatcher-like birds of the genera *Lathria* and *Platypsaris*.

Even this encouraging and suggestive showing could not induce us longer to postpone our visit to the bird islands. Possibly, too, our departure was in a measure hastened by the ticks and mosquitoes, and on the morning of April 14 we continued our voyage, and two hours later landed on Pajaro Island in a tiny cove, with a sand beach overhung by black mangroves—a most attractive camp site. The beach, some 50 feet wide, was bordered by lower, grass-grown, evidently at times marshy, but now dry, ground, and on the other side of this lay a still lower area several acres in extent, covered with black mangroves and other low trees and bushes growing in water.

Up to this time few birds and no spoonbills had been seen; but giving no expression to our disappointment or to our rapidly changing estimate of Señora Maclodeo's veracity, we crossed the narrow marsh and entered the wall of vegetation on its farther side.

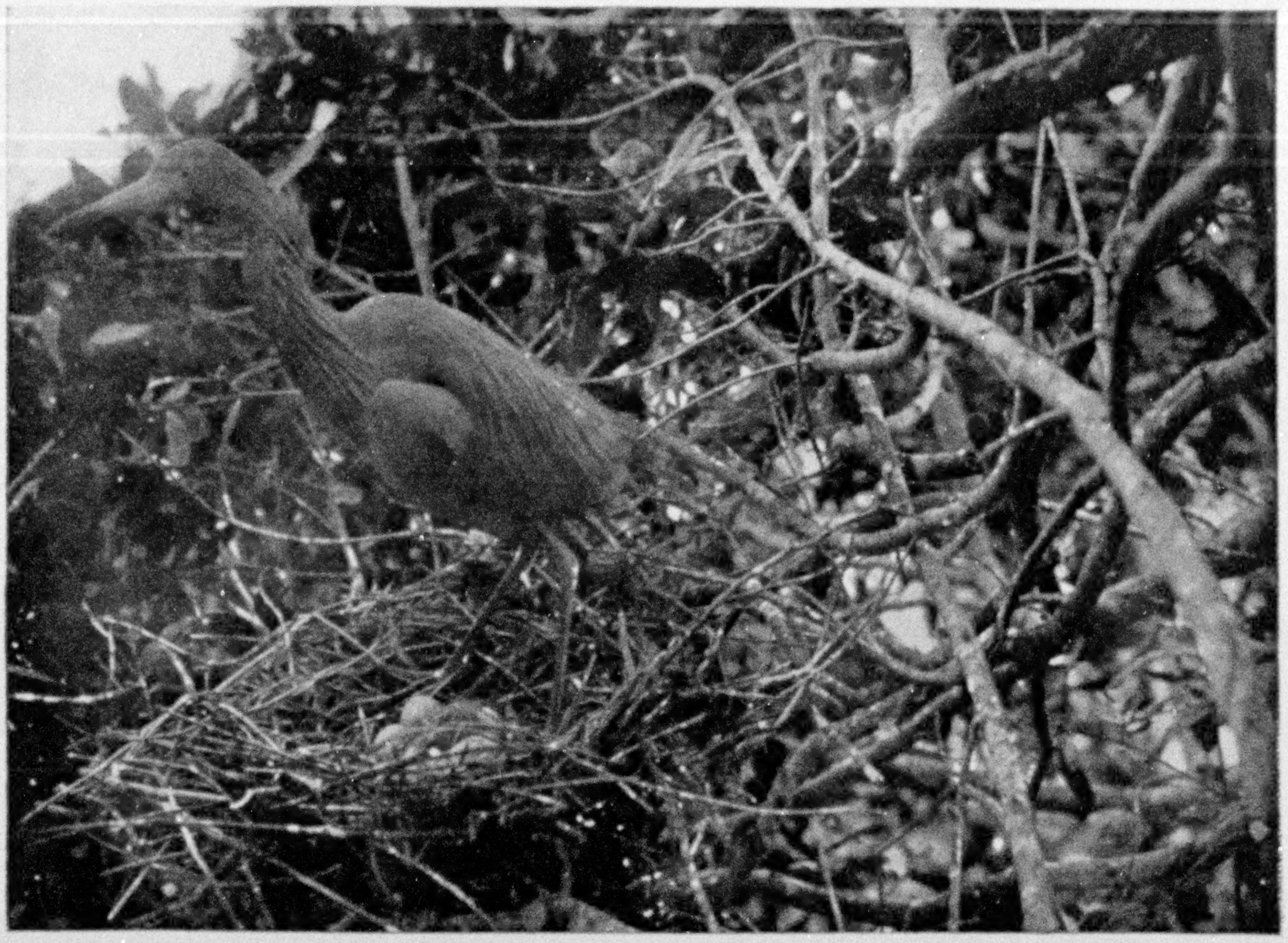


Photo by Frank M. Chapman

A REDDISH EGRET, NOT PHOTOGRAPHED BEFORE

A BIRD PARADISE

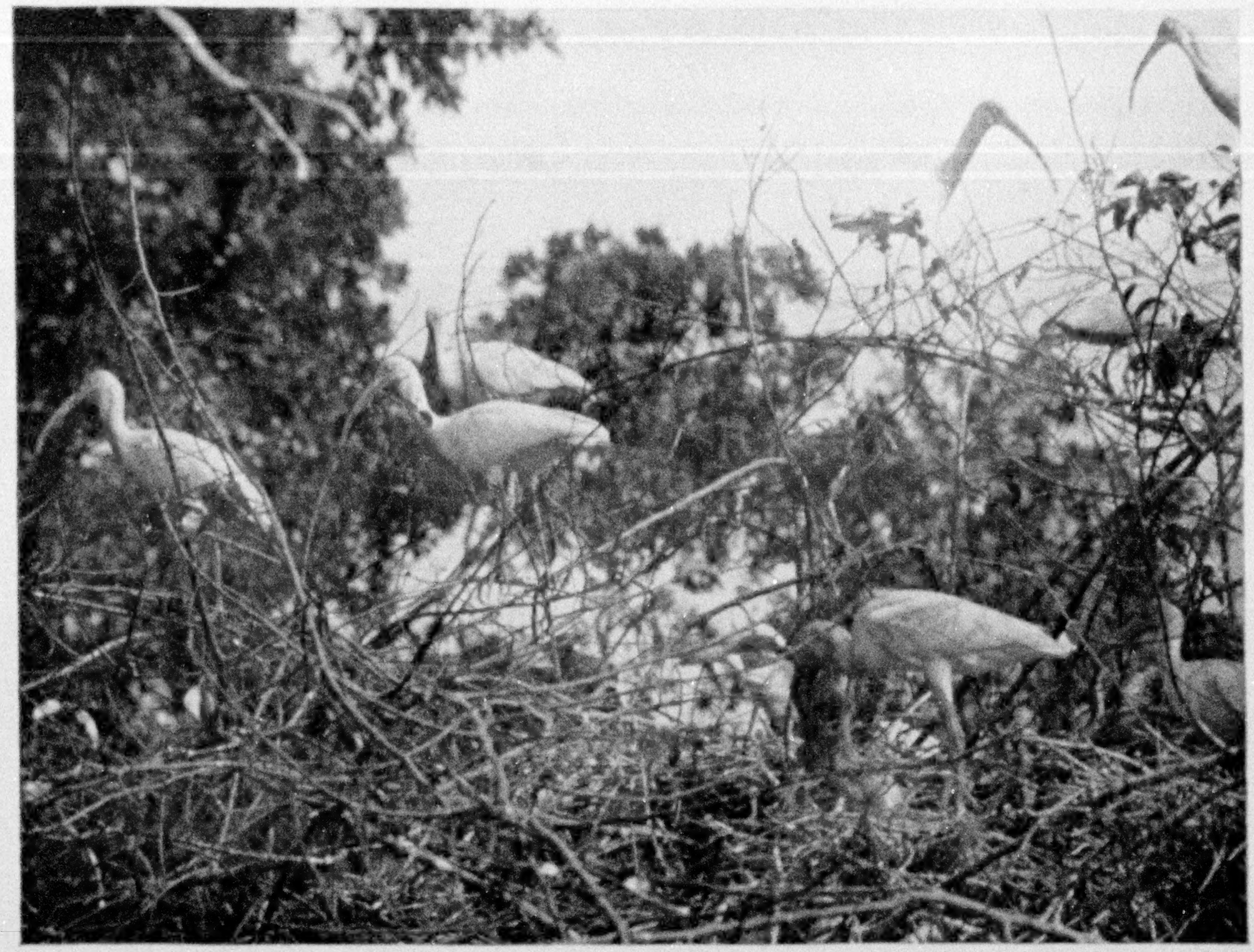
If we had suddenly opened the door of an overcrowded hen-house and thrown a bomb within, the change could not have been greater or the effect more surprising. Hundreds of birds which had been quietly resting at mid-day, with squawks of alarm, sprang into the air, and for a moment we were dazed by the confusion about us. But among the numberless herons of several species we could see dozens of delicately colored pink forms, while in nearly every tree was one or more nests holding young nearly as large and as pink as the parents which had just left them. We had at last reached the home of the spoonbill (see pp. 548-550).

Further exploration revealed a surprising number of birds on the island. There were Louisiana and little blue herons in great abundance, a few reddish and American egrets, black-crowned and little green herons, wood ibis and black-necked stilts, snowy banks of white ibis, and probably 200 pairs of roseate spoonbills. Nearly all were nesting, and it was obvious that we had before us an unusual opportunity to record photographically, both with motion film and fixed plate cameras, the appearance and habits of some little-known birds.

We first directed our attention toward the spoonbills, the most difficult, as well as the most valuable, subjects before us. Satisfactory studies could not be made from below, and the trees were generally too small to furnish support at the desired height, and before a proper location was found and the umbrella blind and cinematograph placed in position our strength, if not patience, was fully spent.

SACRIFICED TO FASHION

The odor from the decaying bodies of white egrets which, stripped of their plumes by hunters, had been thrown into the semi-liquid mud of the rookery, of their dead young in the nests above and water below, of the fragments of food and sundry débris of a great gathering of birds, the extreme heat—the mercury reached 99°—and the abundance of mos-



WHITE IBIS AND YOUNG

Photo by Frank M. Chapman

In the right foreground an ibis is feeding its young, which are, however, protectively colored and almost invisible in the photograph (see text below)

quitoes furnished as many elements of discomfort as one often encounters at one time, and all were intensified within the blind; nevertheless I can recall only one other experience in bird study which has afforded me keener pleasure or more lasting satisfaction.

To go into detail is not possible at this time, and it may simply be stated that a series of plates and motion films were made illustrating the home life of the roseate spoonbill, valuable not only because they had not been made before, but even more valuable because, owing to the diminishing numbers of this rare bird, they may possibly never be made again.

The white ibises were nesting in low bushes under conditions which made photography as easy with them as it was difficult with the spoonbills. One had only to erect one's blind in the open spaces their nests faced and enter it, when forthwith the routine of ibis life was resumed.

The young ibis were almost ready to fly and in their wood-brown plumage were as invisible as their parents were conspicuous. In photographs containing dozens of them only one or two can be clearly distinguished, and even in the motion pictures obtained they can be discovered with difficulty.

AFTER THE IGUANA

I had exposed my last plate on them one day when I observed a heavy-bodied iguana, about 4 feet in length, with his armor of plates and spikes fully developed, slowly climbing about among the nests, pausing here and there to eat leaves. The birds paid no attention to him and he was at least not an unwelcome guest. Being unable to photograph this venerable-appearing reptile, I determined to catch him, and before he realized my presence I was almost within grasping distance (see also page 558).

At that moment he took in the situa-

Photo by Frank M. Chapman

A FLOCK OF IBISES: TAMIAHUA LAGOON, MEXICO (SEE PAGE 545)

tion, half fell, half jumped to the ground, and at top speed galloped over the mud to the lagoon, 50 yards away, and plunged into the water not 2 feet ahead of me. I have not yet made up my mind what I should have done with the formidable-looking reptile if his speed had not outrun my discretion. Iguanas were, in truth, surprisingly common on the little island. The track of their dragging trail was everywhere visible along the beach, and we were frequently startled by having them drop from the limbs overhead and scurry into the water.

DIRIGIBLE AND AËROPLANE

On some neighboring islets brown pelicans and man-of-war-birds were nesting in the black mangroves. The latter were so wholly devoid of fear that in order to secure motion pictures of them in flight it was necessary to shake the limbs on which they were sitting. The mating season was past and the birds were incubating their single white egg, and but one bird in the colony of several hundred was seen to inflate its throat pouch.

This form of sexual display is practiced only by the male, who expands his pouch until in form, color, and appearance it exactly resembles a red toy balloon. This striking appendage is exhibited not only when the bird is at rest, but also when it is in the air, and we secured photographs of a flying bird with this great scarlet bladder hanging beneath its bill—a unique combination of dirigible and aëroplane in bird life (see page 551).

Without further describing our search for land and water birds at sea-level in eastern Mexico, or summarizing what I have briefly written about them, at least enough has been said to show that in its general aspects the avifauna is here highly tropical. Accepting this fact as established, we may now return to Vera Cruz and begin our journey toward snow-line.

Remarkable as is the railway journey from Vera Cruz to the table-land, it must be remembered that the region has been settled for centuries and that the original forest has long since disappeared. To find primeval conditions one must therefore go some distance from the long-established railways. In my opinion the whole region may best be seen from Cordoba as a base. The city itself is unusually interesting, the accommodations good,

XUM

WHITE IBIS: TAMIAHUA LAGOON Photo by Frank M. Chapman

the climate agreeable, the surroundings picturesque, the vegetation luxuriant, the inhabitants thoroughly Mexican, and the views of Mt. Orizaba of surpassing beauty. A railroad leads not only toward both coast and table-land, but another line goes south, and still another goes north. Cordoba, with an elevation of 2,700 feet, is near the upper edge of the humid Tropical Zone, and in an hour or two one may go by train to the heart of the tropics below or to the Temperate Zone above.

BEAUTIFUL ORIZABA

But Cordoba deserves chiefly to be known as the place from which Mt. Orizaba may best be seen. From no other spot known to me is one more impressed by the dominating majesty of this great mountain. Towering more than 15,000 feet above one, its superb, sweeping, symmetrical outlines can be seen from flank to flank, from foothill to summit. A single view of this great volcanic cone will enrich the remaining years of one's life with a precious memory. To be long enough with Orizaba to experience the ever-changing but never failing demands it makes on one's love of the beautiful and sublime, and to realize its power to stimulate one's spiritual nature, is an abiding inspiration.

Further studies of the life of the Tropical Zone were made at Motzorongo, 30 miles to the south, on the lately opened railway to the Isthmus of Tehuantepec. Here we found as highly developed tropical forest as I have ever encountered, and, in addition to many forms of tropical birds, tapirs and monkeys are said to inhabit it. Finally, our work in the Tropical Zone completed, we turned our faces toward the snows of Orizaba or, to be more exact, toward the clouds of Orizaba, for in consequence of a norther which had prevailed for a week we had been surrounded by fog and drizzling rain, and the mountain had been invisible.

The summit of Orizaba can be reached

XUM

Photo by Frank M. Chapman

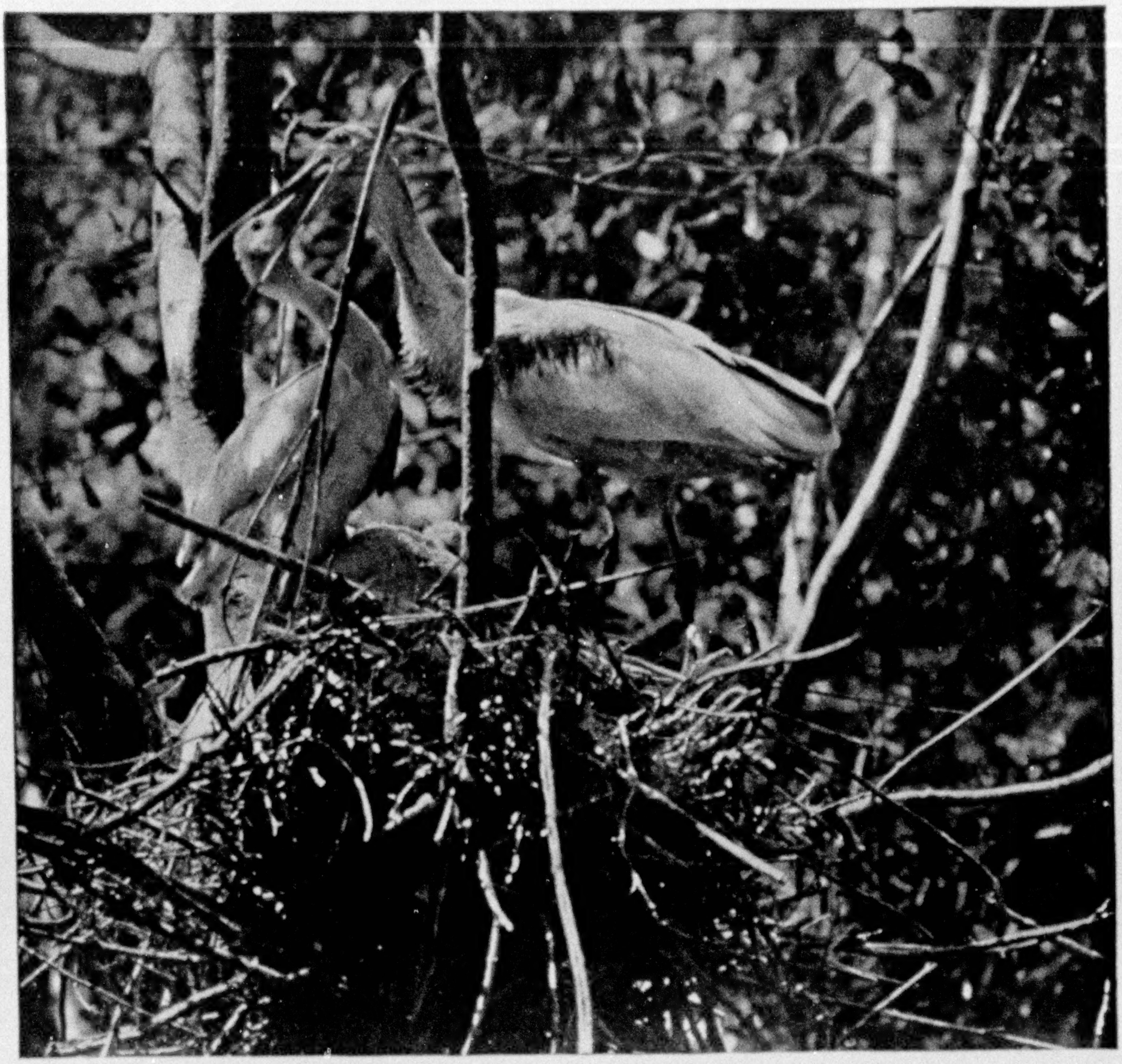
SPOONBILLS: NOTE THE PECULIAR BILL, WHICH GIVES THE BIRD ITS NAME

without great difficulty from the edge of the table-land through San Andres and Chalchicomula. One may travel to an altitude of 15,000 feet by mule, and the remaining 3,000 odd feet are traversed on foot. No physical obstacles are encountered, and the walk to the top is merely a matter of legs, lungs, and heart. To accomplish our purpose of determining the approximate limits of the life zones through which one passes in traveling from sea-level to snow-line, a less frequented and more direct route was desirable, and we determined, therefore, to begin our ascent at Coscomatepec, a quaint and but little-known town at the bottom of the foothills lying at the eastern base of the mountain.

Coscomatepec is 2,200 feet above Cordoba, at the terminus of a railway 20 miles in length. The journey is made in three hours, the train leaving Cordoba at 7 a. m. and Coscomatepec at 12.30 on the return trip.

"DOCE" AND "DOS"

Mistaking "*doce y media*" (12.30) for *dos y media* (2.30), our prospecting party missed the train for Cordoba by nearly two hours and we were forced to spend the night at Coscomatepec. With an outfit of lenses, guns, etc., worth several hundred dollars, our cash assets barely sufficed to buy us the humblest board and lodging and second-class passage to Cordoba in a freight car overcrowded with



FEEDING UNDER DIFFICULTIES Photo by Frank M. Chapman

"We could see dozens of delicately colored pink forms, while in nearly every tree was one or more nests holding young nearly as large and as pink as the parents which had just left them. We had at last reached the home of the spoonbill" (see text, page 544).

natives. This last circumstance so shocked an English salesman that with difficulty we prevented him from buying us first-class tickets.

Several days later Fuertes and I, with W. F. Patterson, a fellow-member of the Explorers' Club, who, finding us at Cordoba vainly searching for a cook, had volunteered to fill the position (which, I may interpolate, is now permanently open to him!), left Coscomatepec with three saddle and two pack animals. Mist and clouds obscured all but the near-by landscape. The trail was good, but as slippery as though soaped, and the animals fell with discouraging frequency. We were now in the Temperate Zone, a region favorable alike for man and maize, and hence so populated and cultivated that the original growth has long disappeared.

The last mango trees and coffee plantations were left at 4,700 to 4,900 feet, and at 5,000 feet the trail was bordered by great sycamores. Within the succeeding 500 feet we saw hawthorn blooming, wild ("rum") cherry trees with green fruit, poplars, and oaks; and these trees, with willows, peaches, pears, apples, elderberries, huckleberries, and lupines, were characteristic of the zone through which we were traveling.

Few birds were or could be seen, but the presence of robins and flickers (both

Photo by Frank M. Chapman

SPOONBILL AND YOUNG IN NEST: TAMIAHUA LAGOON (SEE PAGE 544)

of the western variety) told us that the fauna as well as flora had changed.

Toward mid-day the trail took the crest of the thin ridge between the deep Jamapa and Tlacotiopa barrancas. Dense clouds were below as well as above us. We seemed to be climbing a knife-edge through space. Reaching level ground on what might have been another planet, we camped for the night. Shortly we were visited by a group of seemingly pure-blooded Indian boys from neighboring cabins or jacales, who appeared as much excited by our presence as though we had come from another planet. Particularly were they interested in Patterson's masterly handling of flapjacks, doubtless to them a kind of glorified tortilla, and we ourselves were not without admiration of his skill, and especially its productiveness.

WAKING IN THE CLOUDS

We awoke in the clouds, and all day they hung closely about us. Huts of hewn boards roofed with split shingles, without windows, and with an unhinged door leaning against their one opening, were passed at intervals. At our approach their owners promptly disappeared within, and although our passing greeting was usually answered, the speaker was unseen, but we could almost feel the questioning look of at least one pair of eyes. They were rather an attractive-looking people, with the ruddy olive complexion one finds among the Indians of high altitudes.

At about 9,000 feet we reached the upper limit of corn, and in consequence the upper limit of human habitation. Beyond this point only goatherds and ice-miners were encountered. At the same time we entered the outskirts of the coniferous forests of the Boreal Zone.

PERPETUAL TROPICAL WINTER

A few outlying short-leaved pines (*Pinus montezumæ*) had been seen as low as 5,700 feet, and the pine forests descended at least as low as 8,000 feet. At 9,300 feet we encountered the first spruce (*Abies religiosa*), convincing evidence of the boreal character of our sur-

XUM

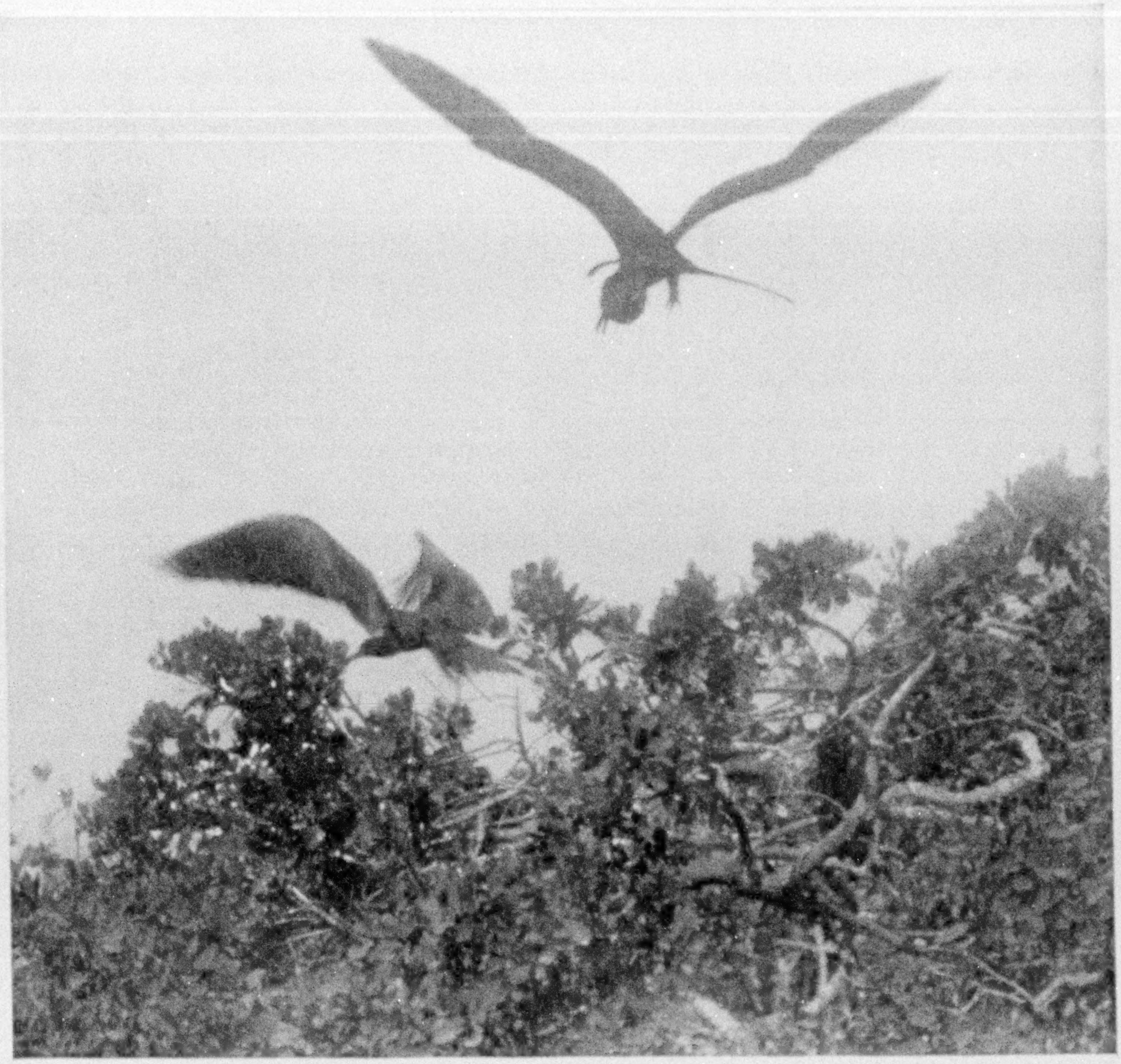


Photo by Frank M. Chapman

AN UNUSUALLY RARE PHOTOGRAPH: IT SHOWS A MAN-O'-WAR BIRD WITH POUCH INFLATED (SEE PAGE 546)

roundings, and at 9,500 feet we camped in a superb primeval forest of pines, spruce, and oak. The pines (*Pinus montezumæ* and *P. liophylla*) compared favorably in size with those of the California Sierras, while some of the oaks, locally termed "*encimos*," we estimated to be 130 feet in height, with a basal diameter of 6 feet.

A singularly incongruous tropical note in this Alpine forest was the presence of Spanish "moss" (*Tillandsia*), which in places heavily draped the trees, and crimson-spiked "wild pines," which in abundance grew from favorable root-holds on their branches. The high degree of moisture prevailing in this zone of clouds evidently creates such favorable conditions of humidity for these epiphytes that they have adapted themselves to a much lower temperature than they could endure under dryer conditions.

At night, enshrouded by the now chilly mist, we sat closely around our camp-fire discussing the prospects of better weather, when, doubtless through a change in the direction of the wind, by us unnoticed, the clouds with surprising suddenness disappeared, and almost as quickly as one would turn on a light the once ghostly forest was brightly illumined by the rays of a full moon! The effect was thrilling, but when we looked upward through the pines and saw, impressively near, the snow-crown of Orizaba gleaming brilliantly, serenely in the moonlight, we were overpowered by an emotion which for a moment left us speechless.

The weather had cleared and in a manner which made the experience the most memorable one of our journey. The following morning was cloudless, and as a reminder that we were in the Tierra Fria the mercury stood at 31° and ice formed in pools left by the rain.

When contemplation of Orizaba permitted we could now take some account of our surroundings. The ridge between the barrancas had narrowed again and on each side we could hear the roar of the over-filled streams tearing down their rocky bottoms, 1,500 feet below us.

BIRDS OF THE NORTH

Birds were common, easily observed, and of absorbing interest. One may read of the occurrence of such typically boreal species as evening grosbeaks and crossbills in the latitude of Mexico City without discounting the impression created by actually seeing them there. Brown creepers (*Certhia*), nuthatches (*Sitta pygmæa* and *S. carolinensis mexicana*), chickadees (*Penthestes meridionalis*), water ousels, juncos (*Junco phæonotus*), siskins, ravens, and hairy woodpeckers were other birds of northern origin seen about or near our camp, while robins, bluebirds, and flickers served further to remind us of higher latitudes. More strictly indigenous forms were olive, and red-faced warblers and the large striped sparrows (*Plagiospiza*).

At an altitude of 10,000 feet we passed a group of buildings locally known as El Jacal, the home of a patriarchal goatherd whose family appeared to be almost as numerous as his flocks. Here the traveler from Coscomatepec to San Andres on the table-land could lodge for the night. The trip therefore may readily be made without other equipment than one could carry on his saddle, and I commend it to every one who would leave the tourist trail and come into closer contact with Mexico than is possible near the line of a railway.

At 11,500 feet the last spruces were observed. At their "timber-line" they were still large, vigorous trees and there was no apparent reason why they should not have continued to appear for at least another thousand feet; but, if unseen, the law that controls their distribution was not the less potent. Shortly they were followed by the long-leaved pine (*Pinus liophylla*), and only the short-leaved pine reached the upper limit of tree-growth.

Camp was made at 12,600 feet, in an ill-selected spot, where, after sunset, the wind swept down off the great snow-fields above us and we could actually see the mercury in our thermometer fall. In 30 minutes it dropped 28°—from 48° to 20°—and at 6 o'clock the following morning it registered 12°. Lack of suitable clothing, though we had prepared for reasonably cold weather, and the suddenness of the change gave us, in spite of a camp-fire, a realizing sense of what it means actually to suffer with cold. Six hours later the sun temperature was 112°, and, suffering now from the heat, we endeavored to adjust ourselves to a variation of 100 degrees in six hours.

MASTER OF THE MOUNTAIN

Long before daylight, on this wakeful night, we heard the tread of sandaled feet and the sound of surprisingly cheerful, laughing voices pass on the trail which led up the mountain. Who these people were and where they were going was later explained to us by a visitor, who, armed with an ancient rifle, politely introduced himself as "el dueno de la montaña"—the master of the mountain—and intimated that in the performance of his duty he would be grateful if we could explain to him the object of our visit to this region in which strangers were rarely seen. Were we Germans? he asked. No; from the United States, we said. "Ah, Englishmen," he replied, and we let it go at that.

He was the handsomest, most attractive specimen of native manhood I have ever set eyes on. I had an absurd desire in some way to "collect" him, and only a realization of how sadly out of place he would be far from his own habitat restrained me from the attempt.

His conquest was completed by Patter-

XUM

Photo by Frank M. Chapman

SCENE IN THE TROPICAL FOREST NEAR VERA CRUZ AT AN ELEVATION OF 800 FEET

"One can actually stand in a tropical jungle, where parrots, trogons, toucans, and other equatorial birds are calling from the liana-draped trees, and look upward to forests of pines and spruce, where crossbills, juncos, pine siskins, and evening grosbeaks are among the common permanently resident species" (see text, pages 537 and 552).

XUM

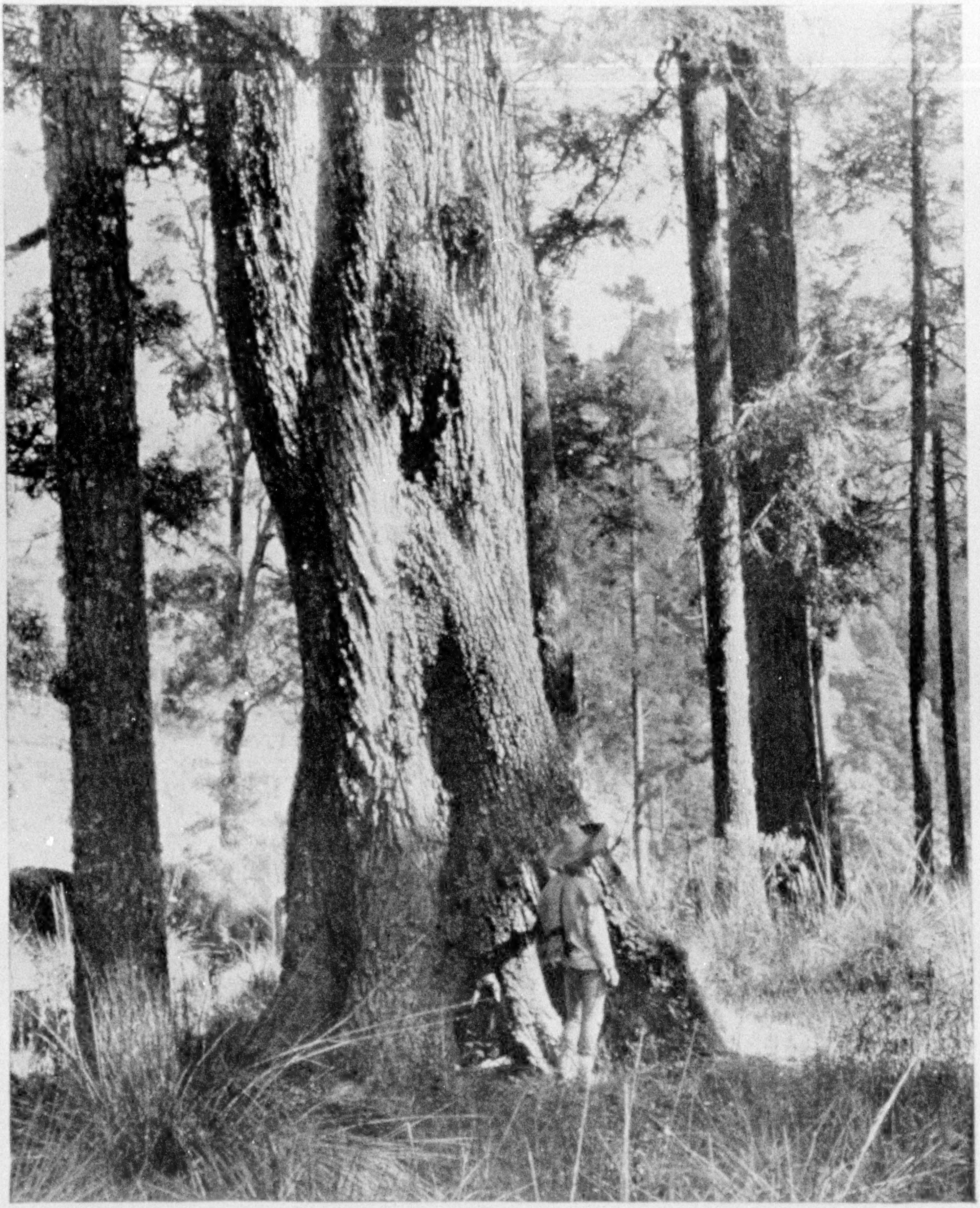


Photo by Frank M. Chapman

A MOUNTAIN OAK (ALTITUDE, 9,500 FEET) UNDER WHICH WE CAMPED

"We camped in a superb primeval forest of pines, spruce, and oak. The pines (*Pinus montezumæ* and *P. liophylla*) compared favorably in size with those of the California Sierras, while some of the oaks, locally termed '*encinos*,' we estimated to be 130 feet in height, with a basal diameter of 6 feet" (see text, page 551).

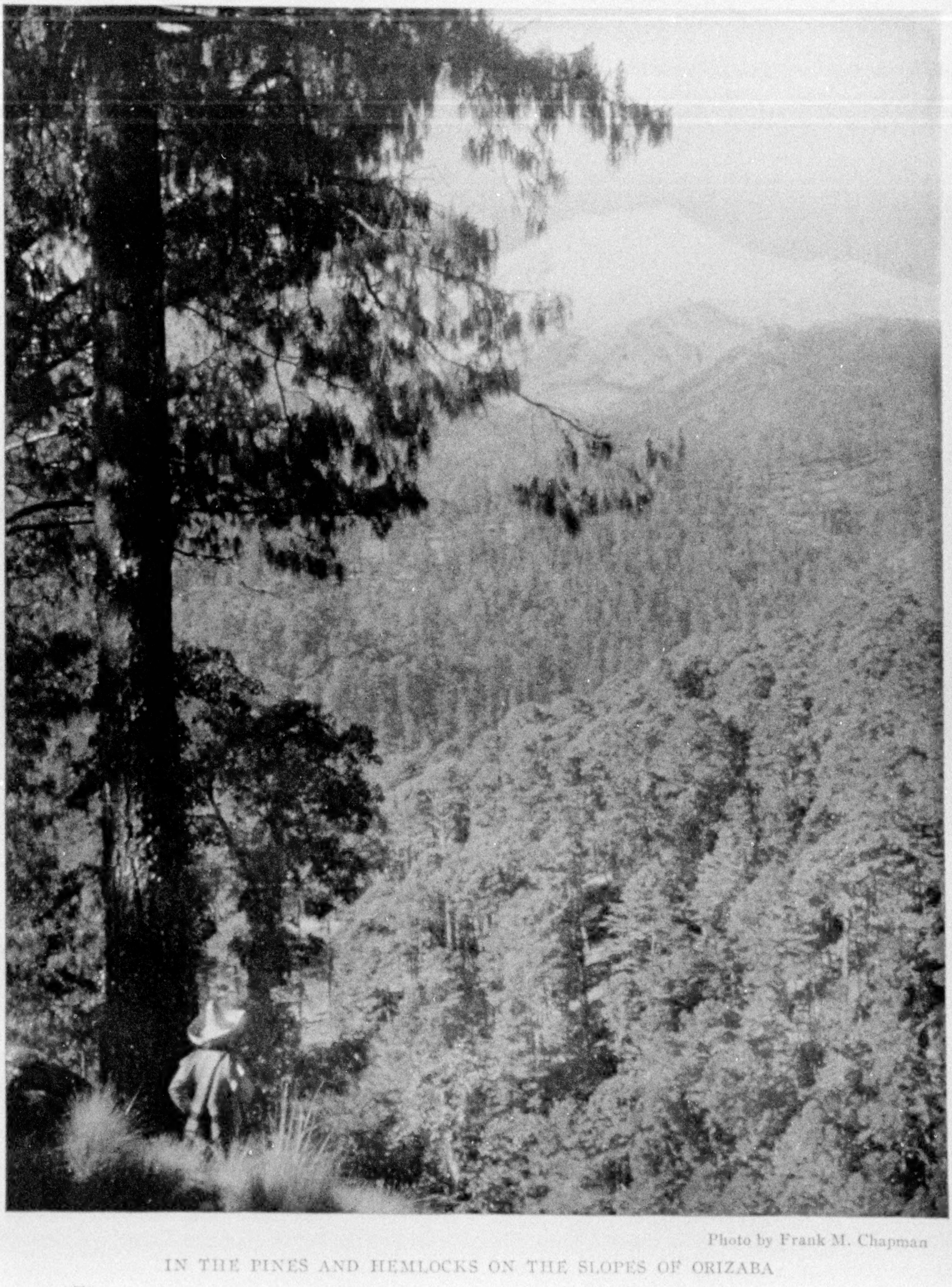


Photo by Frank M. Chapman

IN THE PINES AND HEMLOCKS ON THE SLOPES OF ORIZABA

"The clouds with surprising suddenness disappeared, and almost as quickly as one would turn on a light the once ghostly forest was brightly illumined by the rays of a full moon! The effect was thrilling, but when we looked upward through the pines and saw, impressively near, the snow-crown of Orizaba gleaming brilliantly, serenely in the moonlight, we were overpowered by an emotion which for a moment left us speechless" (see text, pages 551 and 552).

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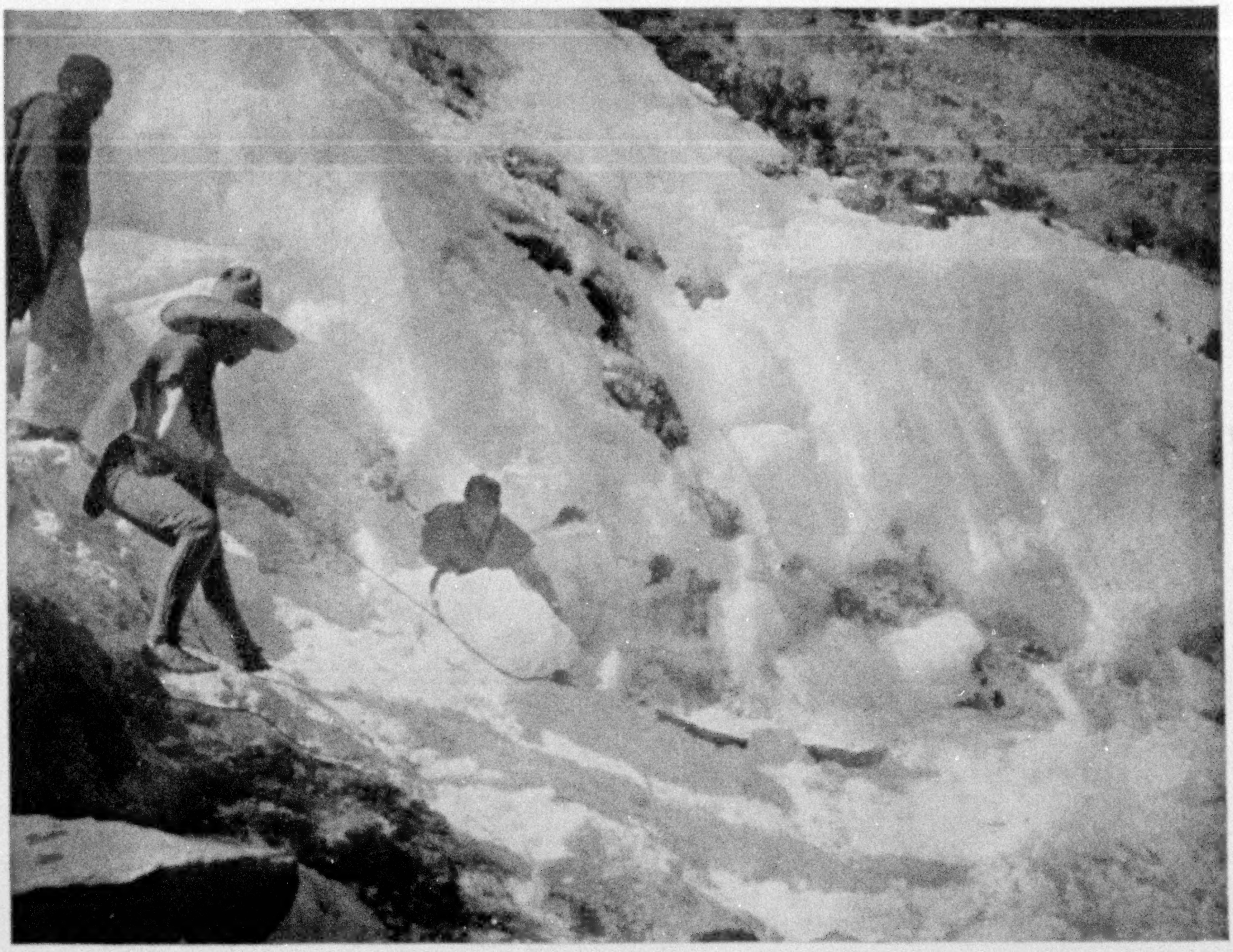


Photo by Frank M. Chapman

ICE MINERS ON ORIZABA: 13,200 FEET

son's flapjacks, and we learned that, representing the owner of the region, his duties were to permit only those to cut wood or mine ice who paid for the privilege. The men who had passed our trail, it appeared, were on their way to the ice deposits near the head of the Jamapa barranca. This cutting of ice near the summit of Orizaba to take to the hot lands at its base is a primitive industry which appeals to one as an eminently practical demonstration of the effects of altitude on climate, and to see it practiced we followed the trail of the cheerful little men from the tropics

Crossing rock-slides where pikas would have been at home, we passed timberline, which on the northern slope of the barranca was at 13,000 feet, but on the southern slope appeared to be at least 800 feet higher. The short-leaved pine was the only tree occurring here, and to the last it stood erect, was symmetrical, and attained a height of about 30 or 40 feet, or about one-half its maximum size.

A CITY'S ICE SUPPLY

Where the barranca narrowed until it seemed a mere crack in the mountain we found a burro staked, and a short distance farther heard voices and the musical sound of cutting ice. We had traced to its source the original "nieve" which a thousand times itinerant peddlers had nasally invited us to "*tome*" (take) in the streets of Cordoba. Cordoba, it is true, is now supplied with artificial "nieve," but Huatusco and other towns to the north not reached by rail still draw on the deposits of Orizaba.

The men were working at an isolated pocket of clear, crystal ice about 100 feet above us. With serapes thrown over their heads for protection from the rays of the sun, and apparently not affected by the altitude, which made us avoid unnecessary exertion, they vigorously chopped out blocks weighing about 75 pounds. With the aid of a lariat these were carefully lowered down the steep

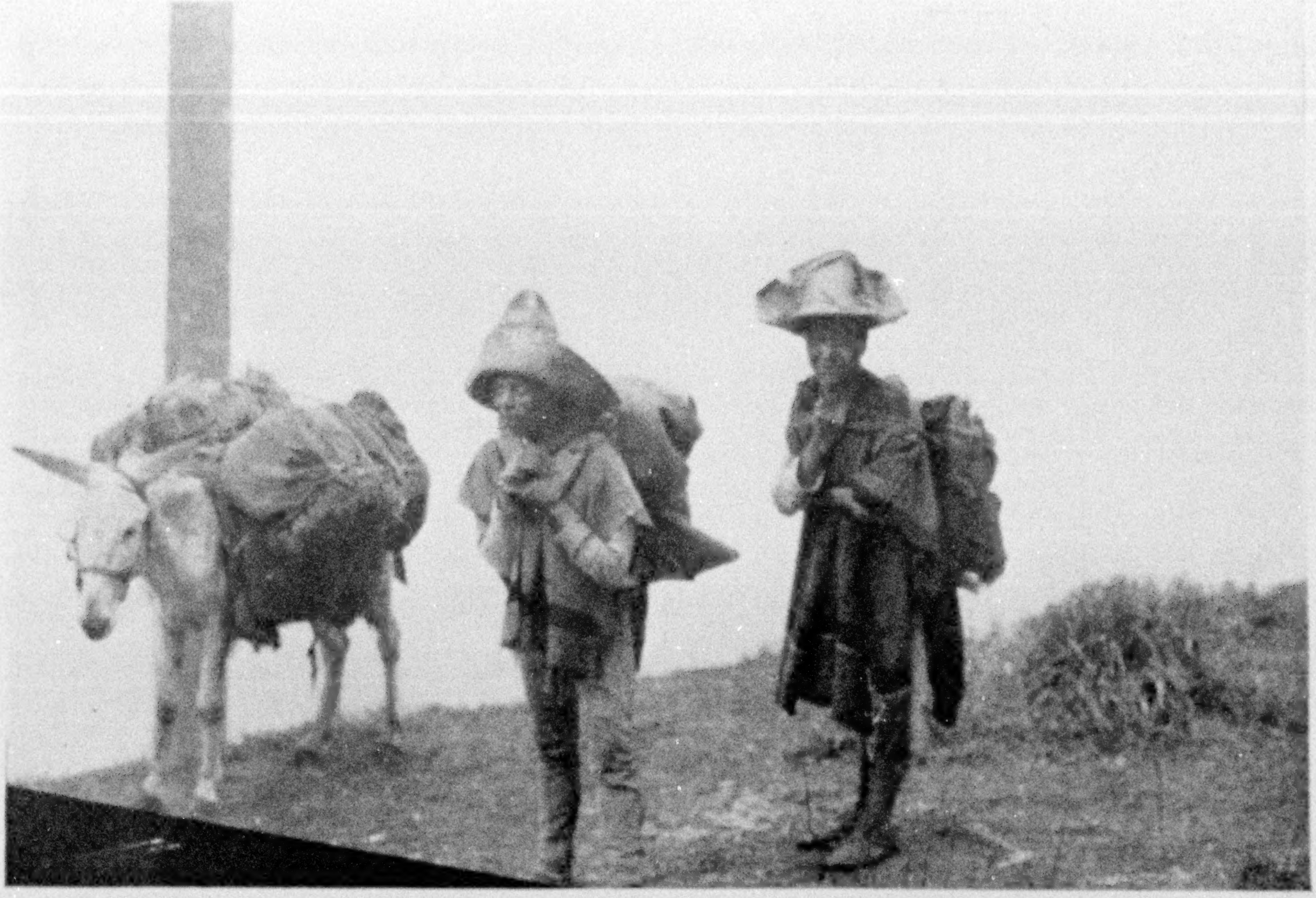


Photo by Frank M. Chapman

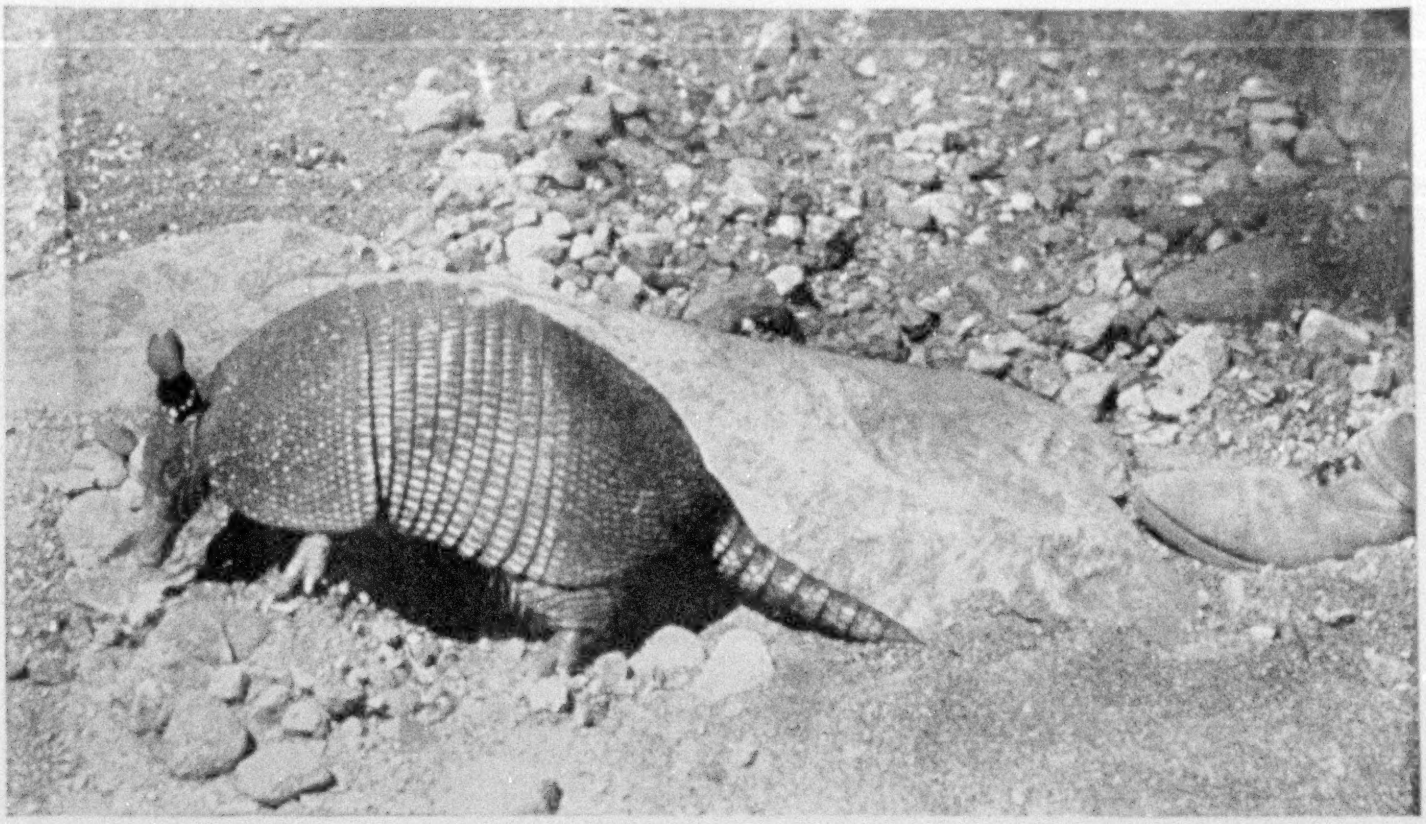
PACKING ICE FROM ORIZABA: A CLOUD-FILLED CANYON BEHIND

decline to the floor of the barranca, there to be wrapped in saccate grass and old serapes.

Late that afternoon these men trotted past our camp, now at 10,000 feet, on their way to the tropics. Each one carried a great cake of ice on his back, and the burro had two. Mentally we followed them in their journey, and the experience was properly rounded when several days later the first sound that greeted us as we stepped off the train at Cordoba was the familiar "tome nieve" of the ice-cream vender.

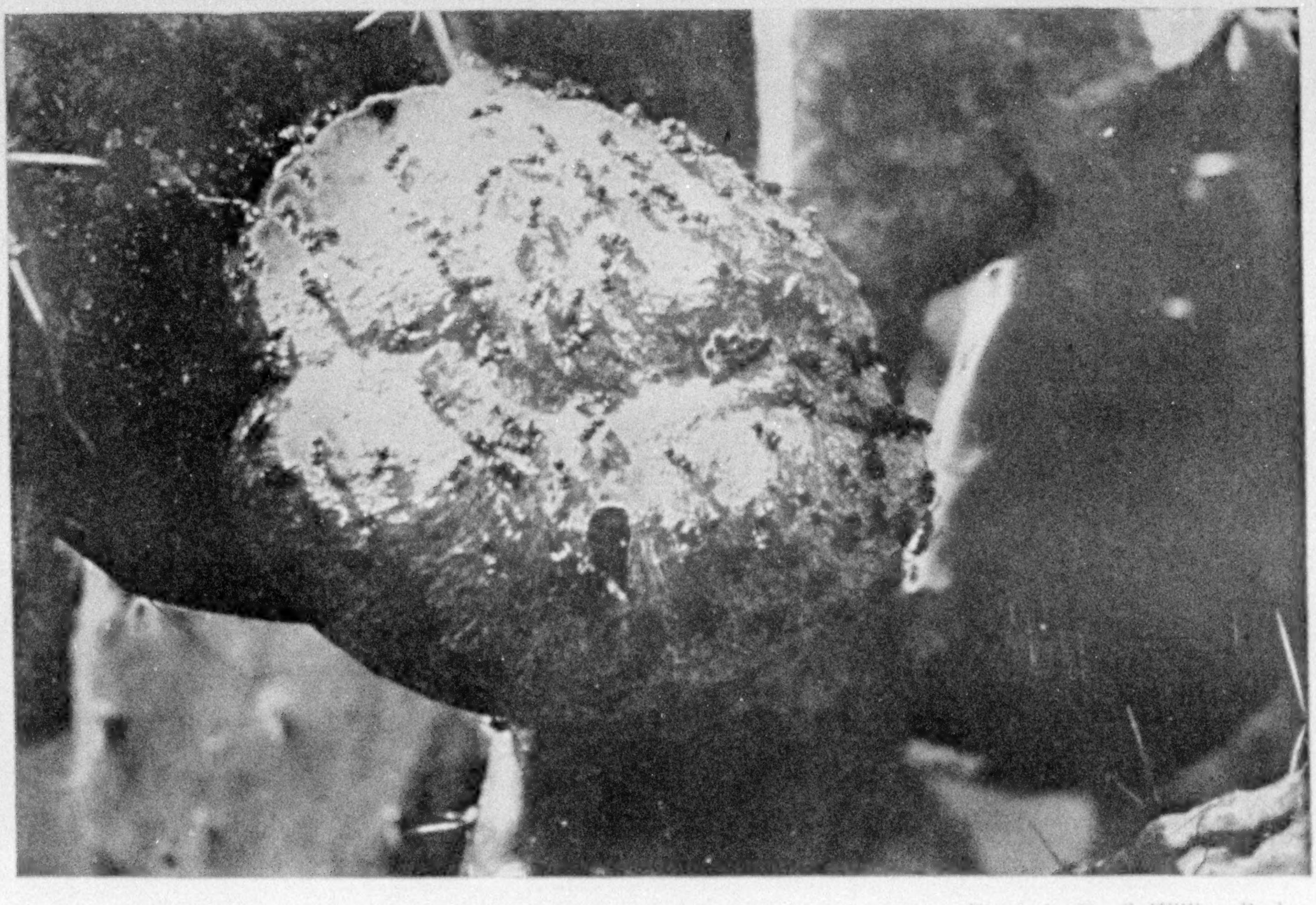
The *dueno de la montaña* assured us that El Pico had never been ascended from this side, thereby quickly extinguishing whatever ambition we may have had to climb to the summit. Our task indeed was finished when we reached the upper limit of life, and with the collections made below we now had specimens of birds, trees, and plants, paintings, photographs, and data with which to construct our proposed Habitat Group of Mt. Orizaba as seen from the Tropical Zone at its base.

In due time this group was completed, and it stands, let us hope, for all time as a not inadequate representation of a mountain which, whether seen from the sea as a sun-kissed cloud, from the lowlands as a sky-piercing cone, or from the pine forests as a massive, glittering dome, always compels the homage we render a great personality.



THE NINE-BANDED ARMADILLO IS COMMON IN MOST PARTS OF MEXICO

Its bony armor is rather a protection against the thorns of the dry country in which it lives than against the attack of large carnivores, which can readily bite through the joints



Photos by Dr. C. William Beebe

PAPER NEST OF MEXICAN WASPS BUILT ON A CACTUS PAD

The insects are small, but very savage, and with exceedingly venomous stings, and if disturbed by a lizard running past will attack one without further provocation

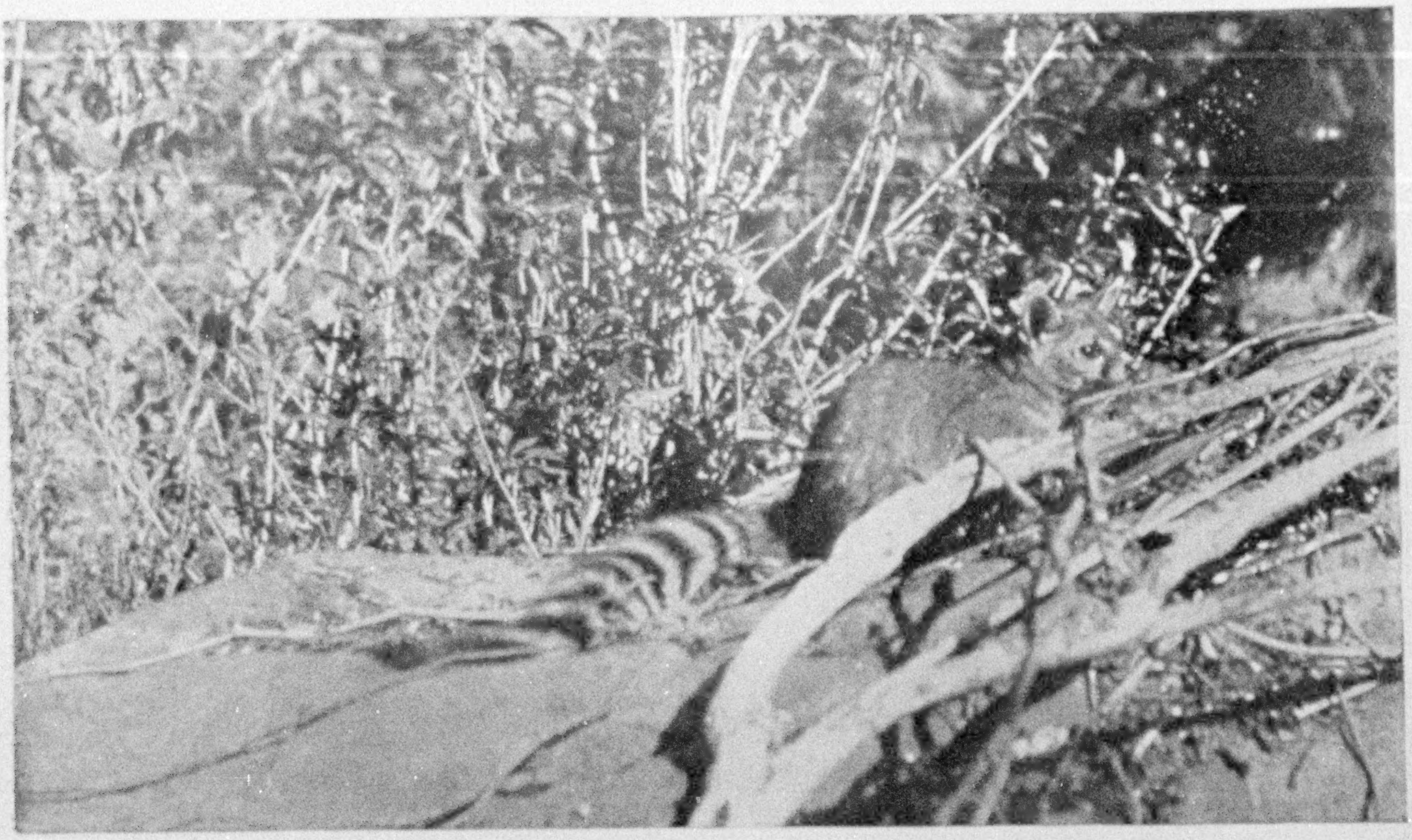


Photo by Dr. C. William Beebe

THE RING-TAILED CAT, OR BASSARISCUS, WHICH PROWLS AT NIGHT ABOUT ONE'S TENT IN THE ARROYOS OF MEXICO

It is somewhat related to the raccoons, but shows close affinity to fossil dog-like creatures which lived in the Oligocene. The tail can be fluffed up until it is as large around as the body.

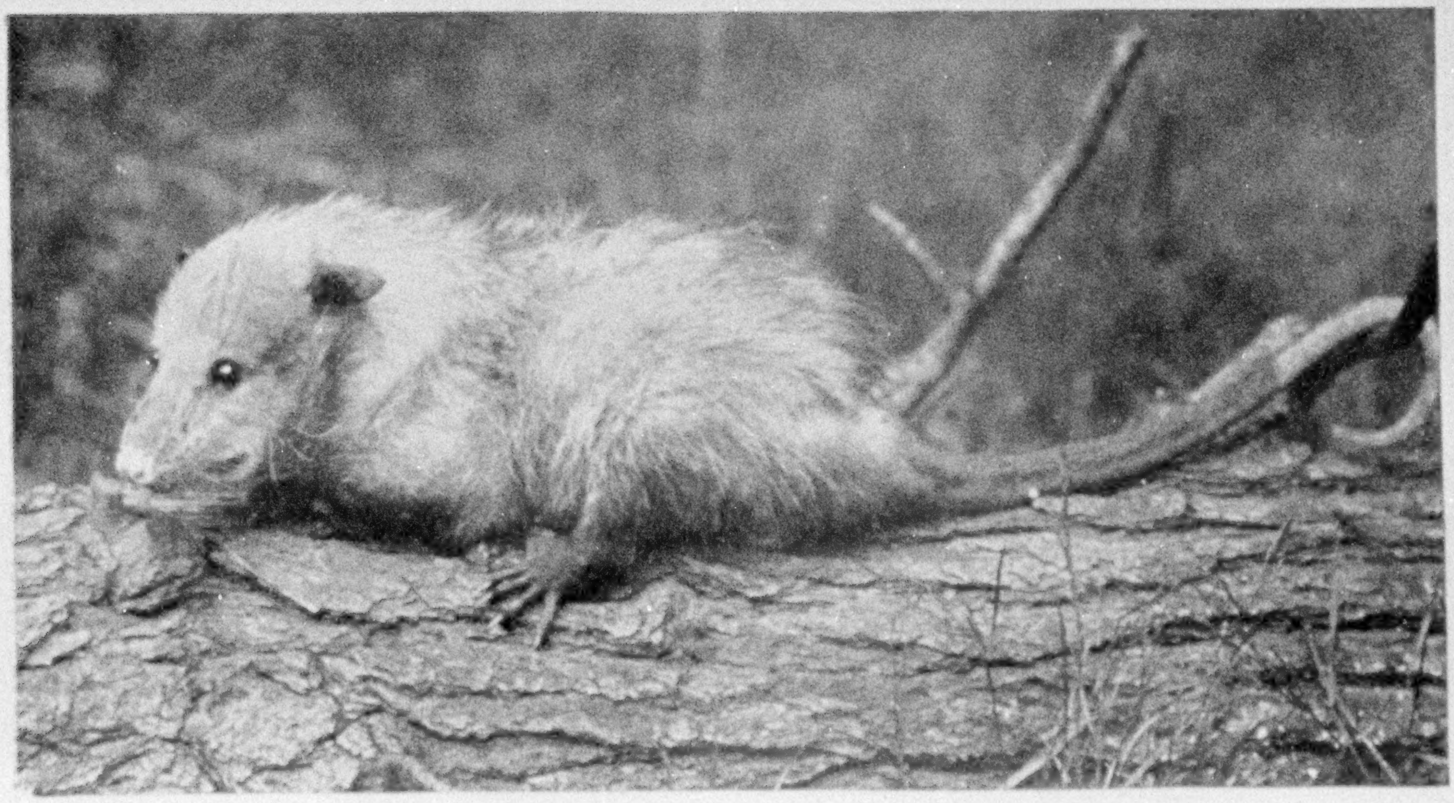
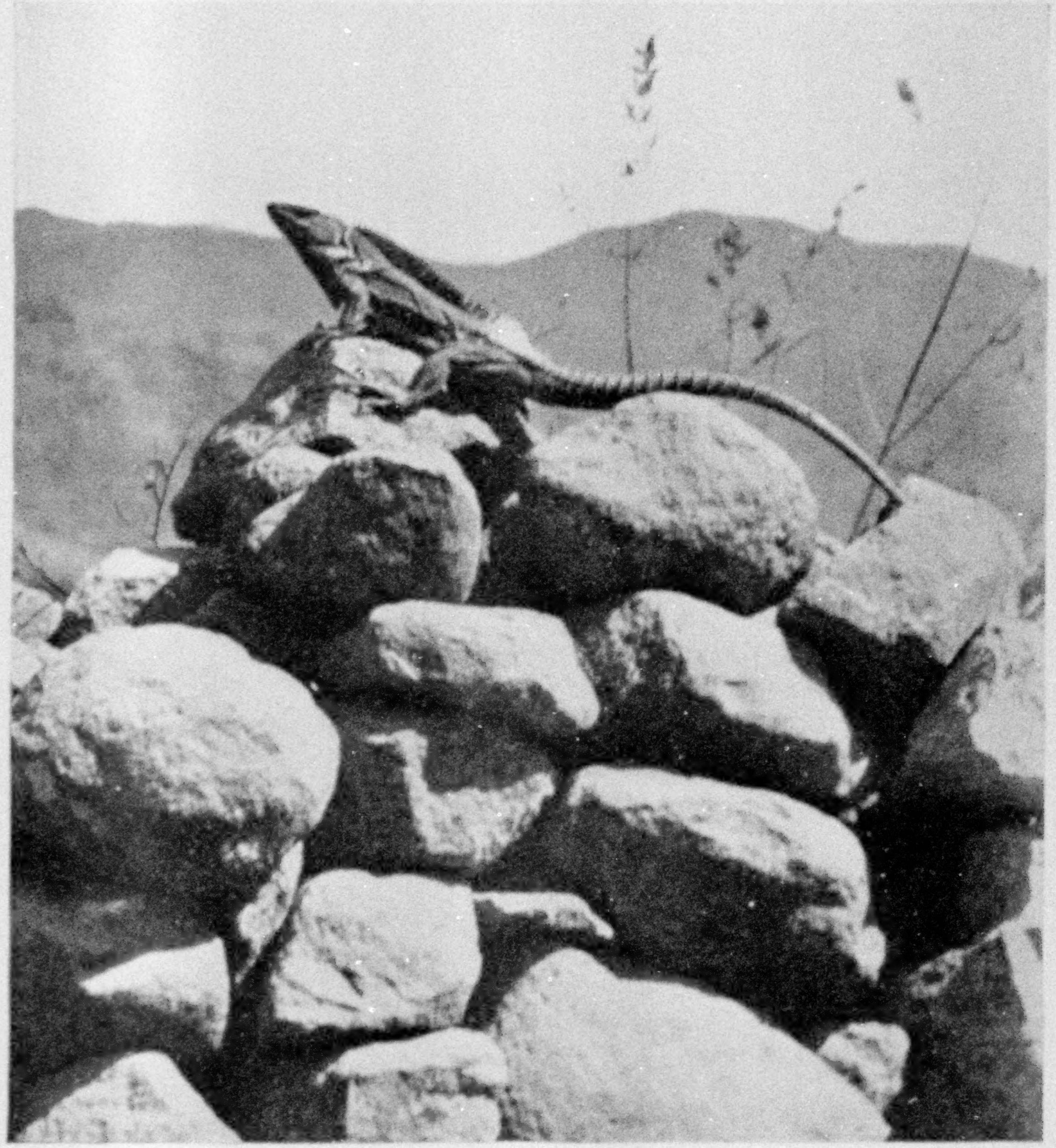


Photo by Dr. C. William Beebe

THE LONG-TAILED MEXICAN OPOSSUMS ARE MOST ARRANT COWARDS

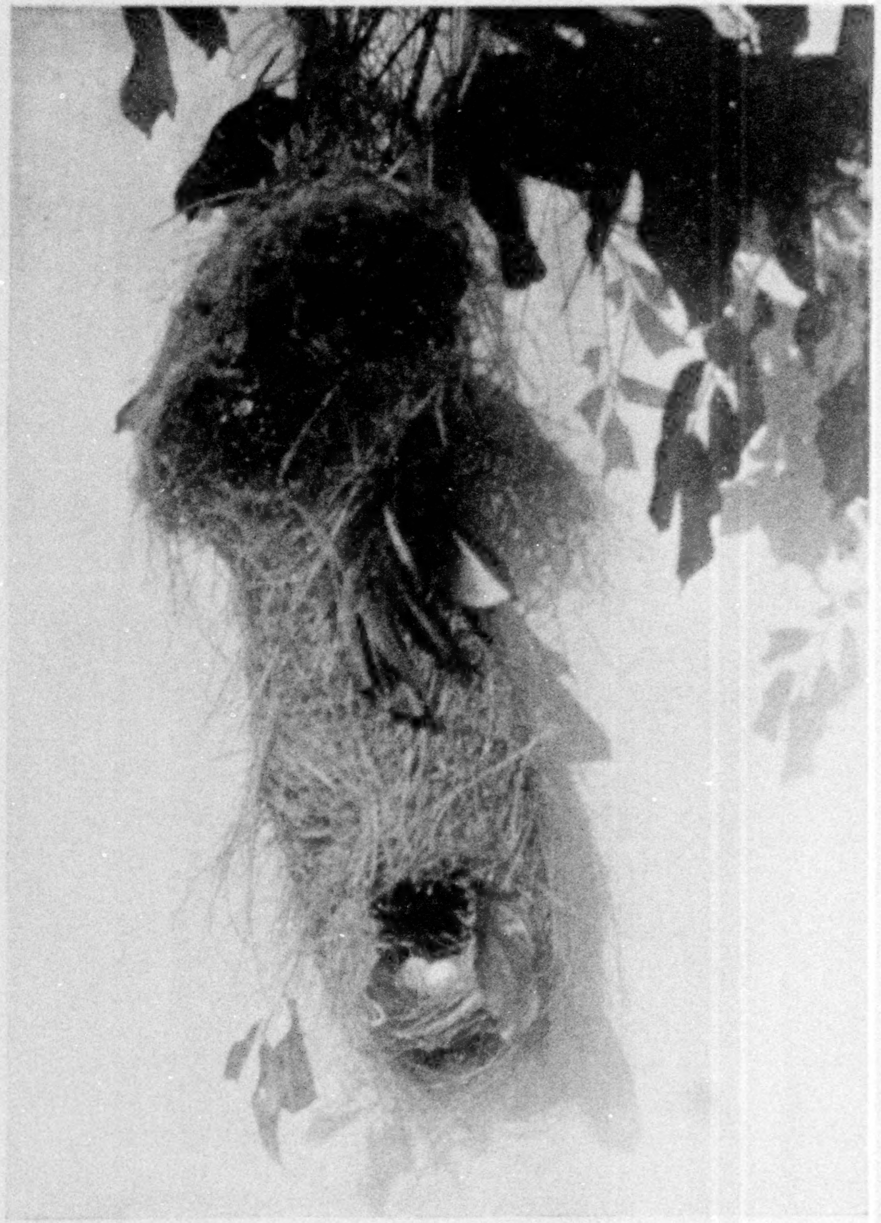
When cornered, they fall over in what appears to be the extremity of death—limbs stiffened, eyes glazed—and recover only when they think danger is past

XUM



Photos by Dr. C. William Beebe

Iguanas in Mexico can be approached closely by a person on horseback, from which position this was photographed. They show how flight may have been initiated in birds by leaping, sprawled out flat, from high trees. Their flesh is more tender and sweet than chicken meat (see also page 545).



The nests of giant tropical orioles, or caciques, in Mexico are pendant structures 3 and 4 feet in length. They are usually built out on the very tips of slender branches, so that they are protected from the attacks of arboreal beasts of prey. Often, as in the above photograph, there is a little subsidiary chamber at the summit, which is used by the male bird as a roosting place when his mate is sitting on the eggs below.

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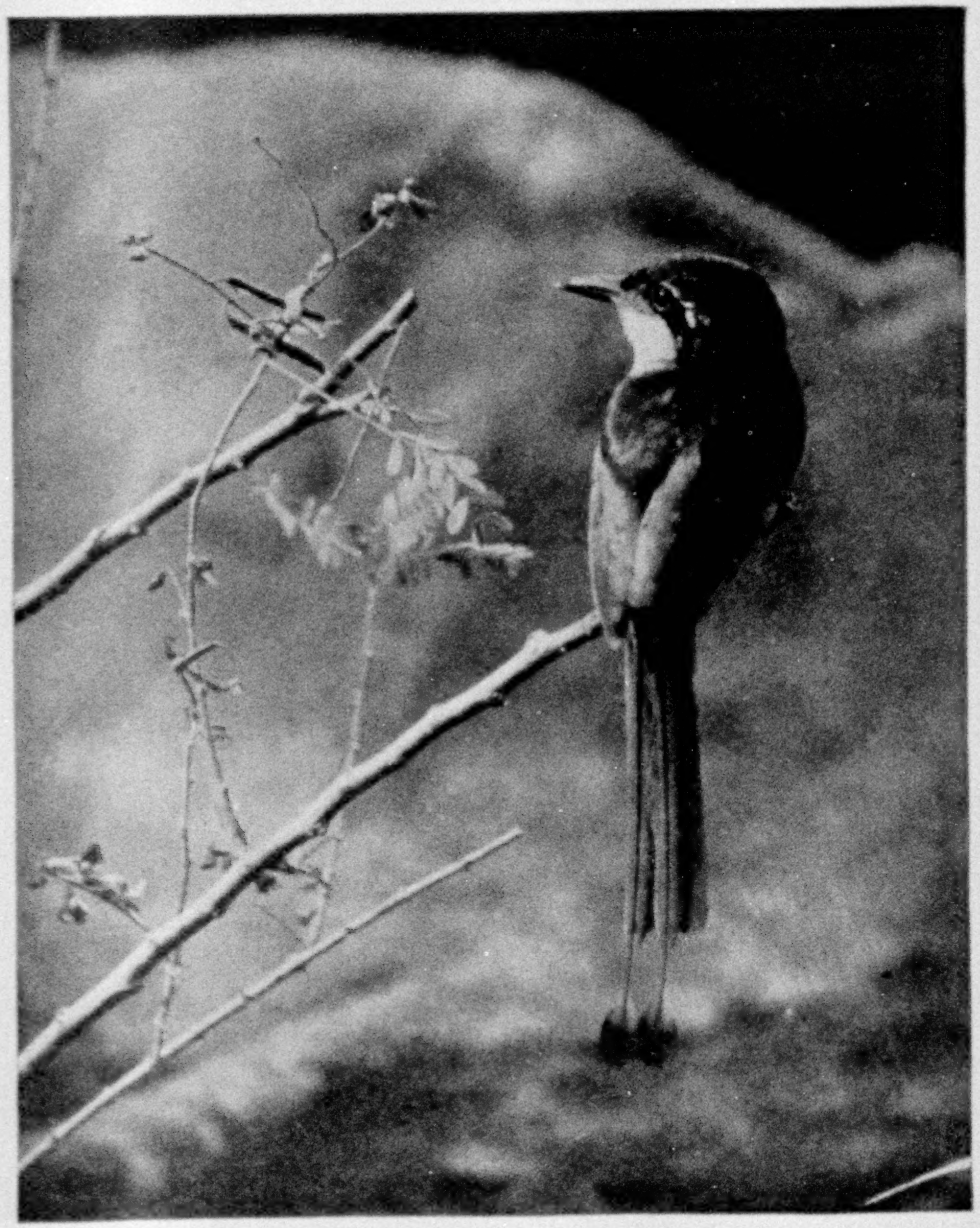

Photo by Dr. C. William Beebe

THE DANDY AMONG BIRDS

The Mexican mot-mot is perhaps the only bird in which the tail-feathers are mutilated by the bird for purposes of decoration after they are full-grown. A portion of the shafts is denuded by the bird, leaving the web at the tips to form a conspicuous racket.

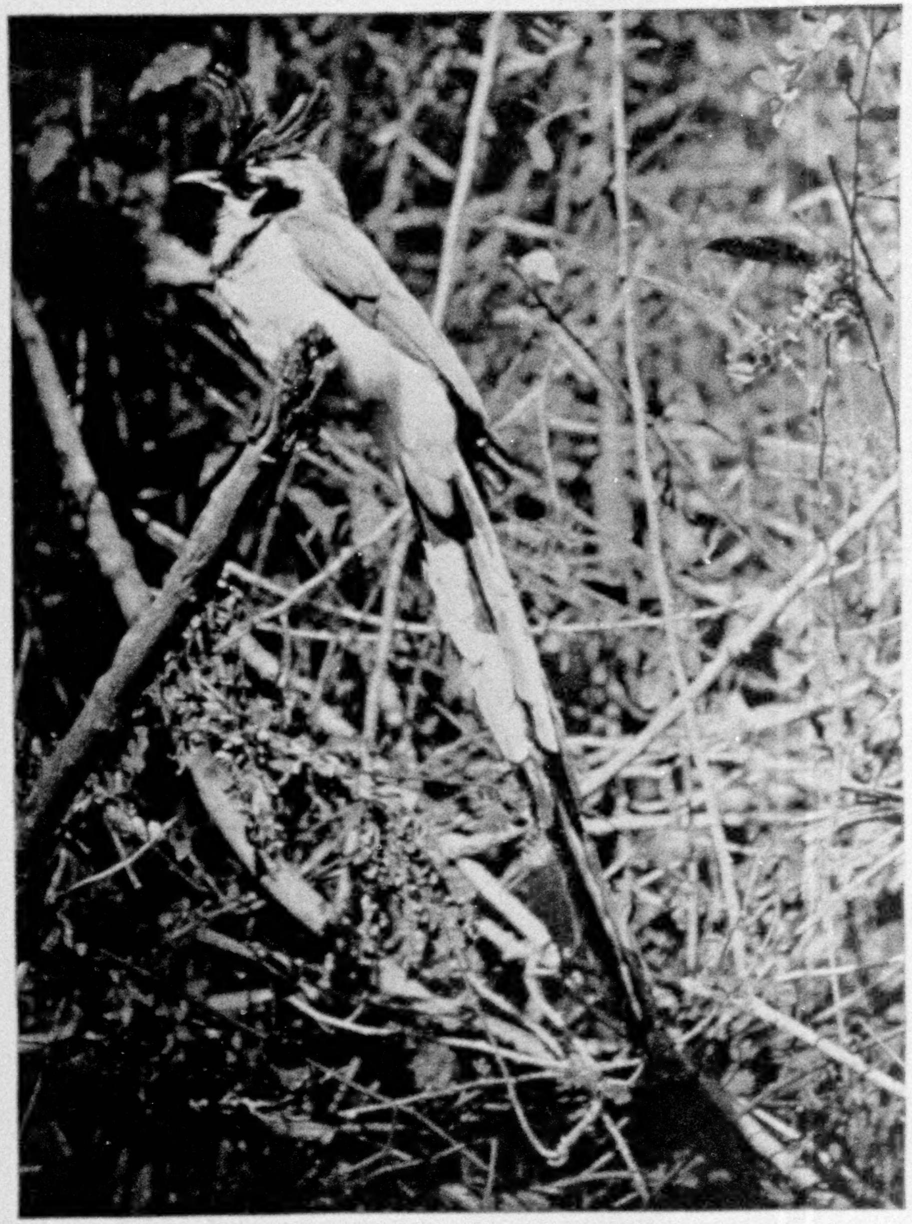

Photo by Dr. C. William Beebe

THE LONG-TAILED CRESTED JAY

Next to the parrots, the long-tailed crested jays of Mexico are the most conspicuous birds at the edge of the table-land. They live in flocks of about twenty and are very noisy. Small birds fear them as they do hawks and for much the same reason, as they are inveterate robbers of nests.

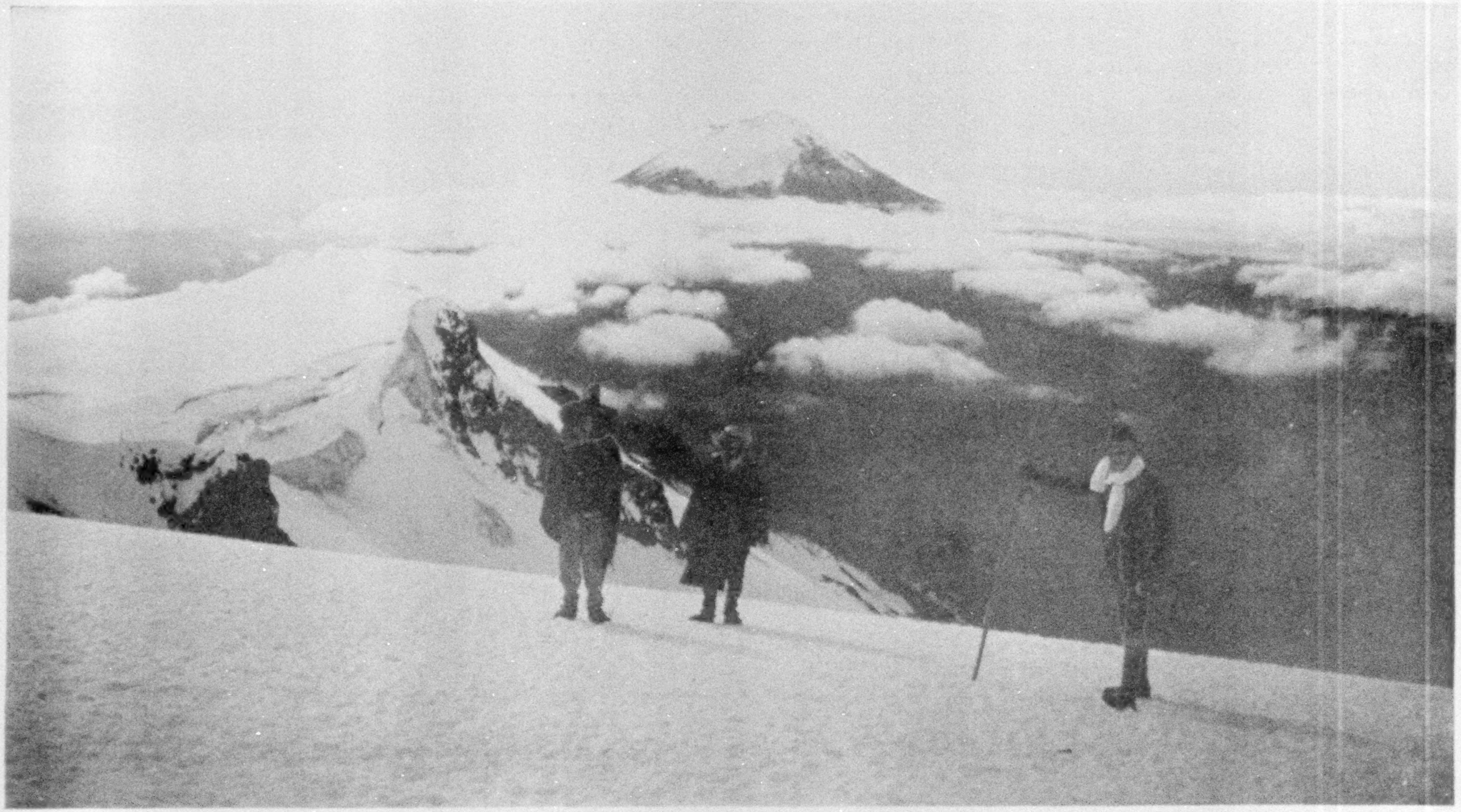

Photo from Alberto L. Godoy

VIEW FROM IXTACCIHUATL, WITH POPOCATEPTL IN THE DISTANCE

Standing guard over Mexico City are the great volcanoes, Popocateptl and Ixtaccihuatl, their summits perpetually covered with snow. From their heights, "the most imposing spectacle of all is the formation of the clouds below you"

A MEXICAN HACIENDA

Life on one of the Baronial Estates of our Southern Neighbor

By J. E. Kirkwood

Professor of Botany in the University of Montana

Extending southeastward from the Rio Grande, between high sierras on the east and west, is the Mexican plateau. About 250 miles in width, this area extends from Juarez to its southern extremity, about a thousand miles. Throughout an arid land, it lies under a clear sky and has few streams and little rain.

Its extensive plains are traversed at intervals by more or less isolated mountain ranges, mostly trending in parallel course with the Sierra Madre, which form its eastern and western walls. The mountains rise from 8,000 to 10,000 feet, but in the interior of the country they appear much lower, owing to the elevation of the plain itself, which increases in altitude from about 3,700 feet at Juarez to over 8,000 feet near the City of Mexico. The topography of this region is very similar to much of that of Arizona, New Mexico, and western Texas.

Though seemingly desolate, the land abounds in life, and the representatives of its fauna and flora occupy places in widely differing families of animals and plants. The country supports, however, a meager and scattered population, which, outside the cities, is concerned chiefly with mining and stock-raising. While physically capable of a larger development agriculturally, this has not been possible under the system of land tenure which now obtains and has existed in Mexico from the early times of the Spanish occupation. The creation of enormous private estates, devoted to mining or grazing, and the domination of large sections of the country by the interests of a single individual or family have greatly hindered the growth of agricultural industry.

FEUDAL AND ARISTOCRATIC

The Mexican estate known as a hacienda is in some respects a remarkable institution. Feudal in its traditions and aristocratic in its management, it reminds one of the old-world baronies of the middle ages. Consistent with political conditions in a country little more than nominally democratic, it is, nevertheless, so at variance with American ideals of liberty and equality that not the least of the interest in the system lies in the fact that such medievalism has flourished at our own doors up to the present time.

The story of the haciendas is one of romantic interest. Each, largely a law unto itself, developed its own institutions, had its life and activities apart from the rest of the State, and to all intents and purposes constituted a distinct social and economic unit.

The writer, not long ago, enjoyed the opportunity of a year's sojourn upon one of these haciendas. This estate, the Hacienda of the Cedars, is 70 miles long by 60 wide, a domain about equal in area to the State of Connecticut. Although much smaller than some of the other haciendas, it nevertheless constitutes a considerable property, being 2½ million acres in extent. From center to circumference is a day's journey or more, and the proprietor, when he visits the outlying portions of his estate, prepares for a journey of days or weeks with coach-and-six and attendants and much of the air of a petty ruler.

The Hacienda de Cedros, or, in more exact terms, the Hacienda de San Juan Bautista de los Cedros (the Hacienda of St. John the Baptist of the Cedars), lies in the northwestern corner of the State of Zacatecas. Mr. Charles T. Andrews, writing of life on a Mexican hacienda, says of this place: "There are several traditions in regard to the early history of the Cedros hacienda. One is that the original grantee obtained the land as a sort of subsidy for a missionary propaganda for 'the conversion of the Indians

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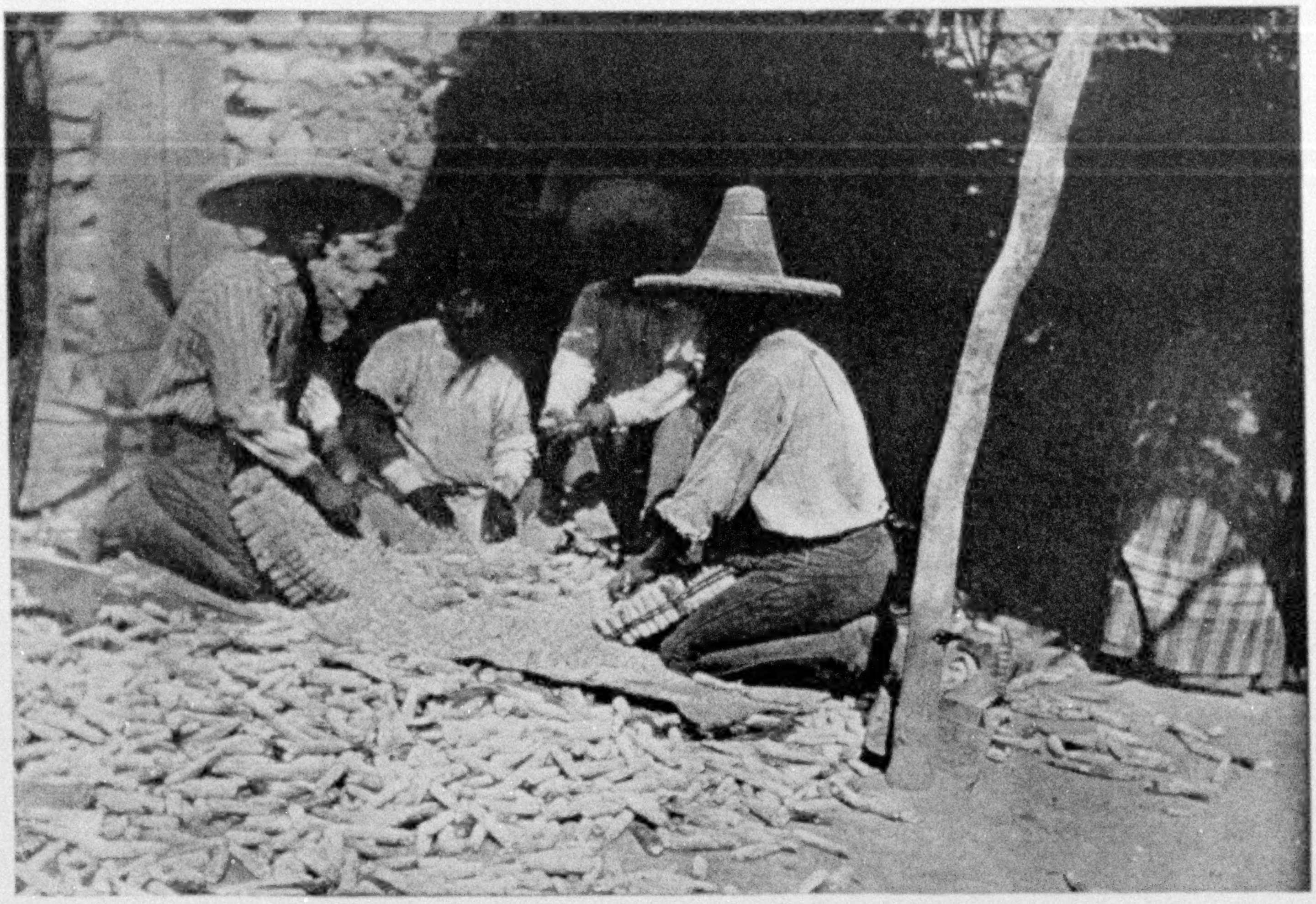


Photo by J. E. Kirkwood

PEONS SHELLING CORN ON THE HACIENDA DE CEDROS

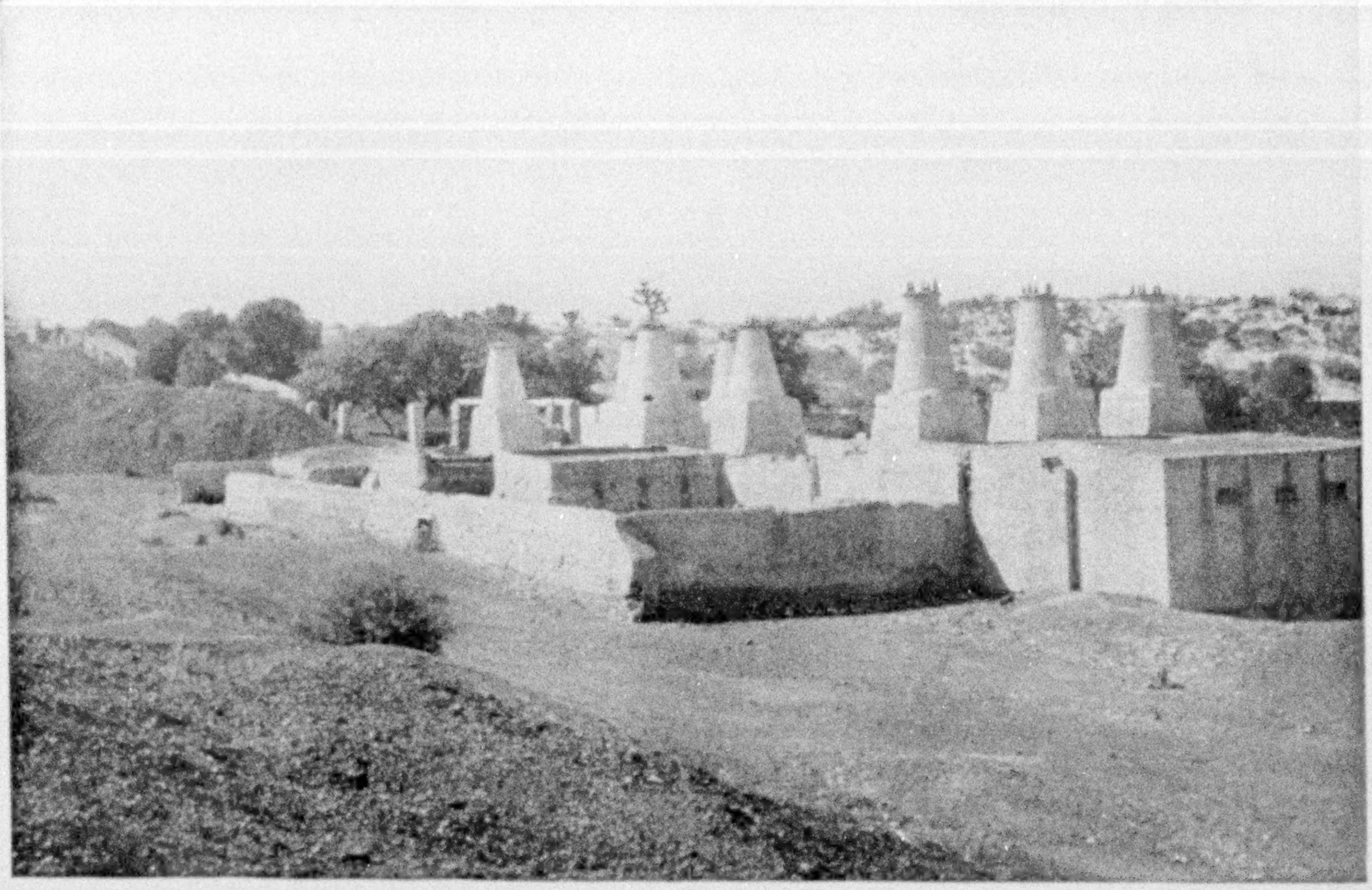
Ears are rubbed on blocks made by binding together corn-cobs. "One observing their farming in the outlying districts might imagine himself living in the days of the Pharaohs. The field is plowed with a crooked stick drawn by oxen, with the yoke tied to the horns. Grain is cut with sickle and threshed by the hoofs of cattle, and corn is planted and shelled by hand. Rough and heavy home-made carts or the backs of men or burros are the most common modes of conveyance. The people seem to have no appreciation of improved farming implements. Often when improved implements are provided the laborers they discard them for more primitive methods" (see text, page 573).

and the glory of the church.' There still remains indeed in the archives at Mexico a map of the hacienda with a sketch of the church building he proposed to erect. According to these plans, the sacred edifice would cover about five acres. The result was like some modern schemes for public aid to private enterprise. The promoter got 2½ million acres of land and the church got a building 40 by 60 feet.

"With less pious pretense, but by equally dishonest methods, a second purchaser obtained the property at a later period. For some reason, either through escheat or confiscation, the crown again came into possession of the hacienda and offered it for sale. An official in Mexico, taking advantage of the ignorance of the home government, represented the property as simply a desert waste, very undesirable; but, 'in order to relieve the crown of an unsalable asset,' he magnanimously offered to pay 6,000 Spanish dollars for it as a virtual contribution to the support of the throne, and thereupon received a deed, with the thanks of the monarch for his loyal zeal!"

Some one who knew of the facts as they then were later endorsed the following on a blank page of the deed itself:

"This reprobate son of a degenerate father, . . . knew that besides rich deposits of minerals and large flocks of sheep and goats, the hacienda had at that time 30,000 head of beef cattle, which, to say nothing of the rest, the unmitigated scoundrel got for 20 cents apiece by outright and deliberate lying to his Most Catholic Majesty, the King of Spain."



THE OLD SMELTER AT CEDROS Photo by J. E. Kirkwood

The slag piles in the foreground and the distance cover several acres. These piles are said to be of considerable value because of the large amount of mineral which the original process failed to extract (see page 577).

The Mexican Central Railroad crosses a corner of this estate at some distance south of Torreon. The station of Camacho, a sun-scorched and wind-swept row of adobe structures, is upon the hacienda, and eastward, over a distant range of mountains, lies the village of Cedros, the capital of this principality. Some 60 miles intervene, however, and to visit it one must proceed thither by horseback or wagon.

Cedros lies on the high border of a plain that reaches leagues long and wide to the west, north, and south. Eastward rises the range of the Potrero. On the horizon to the northeast are the furrowed slopes of the Zuloagas and to the west and southwest the Sierras de Zapoca and Guadalupe.

Thirty miles to the west the Zapocas rise as a mountain barrier along the whole horizon.

ENTRANCE TO CEDROS

Entering the hacienda from the east, this splendid panorama is gradually unfolded to view. When the afternoon sun is low and shadows are mounting the slopes, the slanting rays sweep the wide expanse with a glow of changing color. Rising out of the mountain chain, high above its fellows, stands a lofty peak, with its rugged crest outlined against the glowing sky. Clouds that rest upon it are tinged with gold and crimson and all the brilliant colors of a sunset such as no other land knows. This eminence, known as Pico Teirra, commands the whole of the surrounding country. Dark and rugged to its summit, which lies above 10,000 feet, its somber shadows are deepened by the thin growth of oaks and pines which clothe its higher slopes.

As the morning light strikes across the landscape, the watcher at Cedros may catch the glimmer of white at the base of Teirra, making faintly visible the hamlet of San Rafael. Half way to the peak across the intervening plain two small mountains stand as detached members of a lesser range at its southern extremity. Here a few dwellings comprise the village of Tecolotes, which, with a fortified inclosure and a water reservoir, marks a

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station on the wagon road and is 17 miles away, though seeming but three or four.

Far to the northeast the plain reaches level to the horizon. Where the ranges converge in the distance the shifting mirage raises phantom hills which change in the glimmering heat, and *remolinos*—tall, slender columns of dust-laden whirlwinds—glide across the landscape and dissolve from view.

A SMALL CITY

Many small assemblages of huts or houses are scattered over the place and are the homes of small ranchers or herdsmen. In all, about 2,000 people live upon the Hacienda de Cedros. These are distributed about in small groups here and there, where springs may be found or wells dug, or where the configuration of the land makes possible the gathering of the rainfall into reservoirs.

Water is precious, and its relative abundance determines the size of the village and often the nature of its operations. Issuing from the limestone at the western end of the Potreros are a number of fine springs, some warm and others cold, providing for irrigation of the gardens, for the baths, and for household uses. Some supply the long, stone troughs where the herds come to drink. About these springs has grown up the little town of Cedros, and the cottonwoods have grown with it, until across the country their spreading tops are visible afar and almost obscure the white walls of the buildings they overshadow. It is a rare oasis in a wide desert, and grateful shade here beckons the traveler to its restful shelter.

Here all roads lead to Cedros. Tenuous threads of white, cutting the dull green of the distant plain, can be seen converging to this point like the spokes of a wheel. The site, well chosen for strategic reasons, commands its approaches on three sides, while the rough slopes of the mountain lie to the rear. Precautions against Indians and others were necessary in the early days, and parapet and loophole are still visible in the construction of the larger buildings. Though such occasions are less to be expected now, the place is still well adapted to withstand a siege of small arms. The defenses here have somewhat fallen to decay; but at outlying stations some are yet well preserved, as where Cañada Blanca, with wall and battlement, furnishes a place of refuge in the grazing country two days' journey to the west.

The village of Cedros consists of the casa grande, or manor house, with its associated structures, and the church, the dwellings of the peons, a rope-walk (see pages 574 and 575), an old smelter (see page 565) and ore mills, and corrals. Aside from the casa grande and its grounds, the village does not cover more than the space of three or four city blocks.

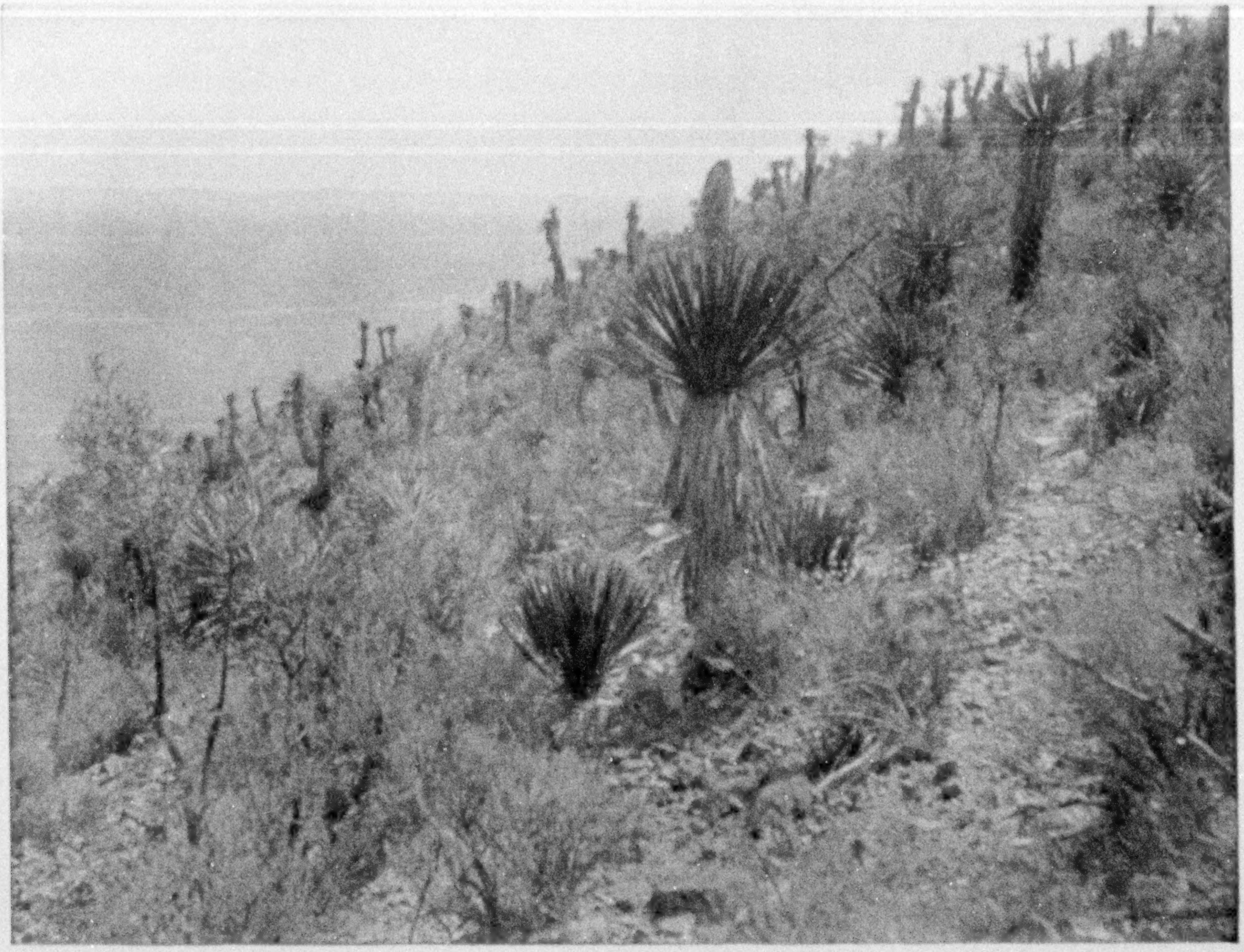
HOMES OF THE PEONS

The homes of peons are either huddled in groups or scattered about the outskirts, and, though mostly permanent structures built of adobe, they are arranged in no definite order, but are set up wherever chance or the convenience of the builder dictated. Many of the dwellings have small adjoining inclosures formed by a paling constructed of the wand-like branches of the candlewood, serving for garden lots or corrals.

Cheer and comfort are scarcely known to the peons' habitations. They are usually without the luxury of windows, the door serving to admit all the light that enters. The poorer huts have merely a hole in the wall as a means of entrance and exit; sometimes a room adjoining has no exterior opening, but is reached by a hole in the partition.

In these hovels some live, begrimed and hungry, in hopeless poverty. Others of the dwellings are much better. Such may boast some coarse matting and rude home-made furniture and decorations of colored picture-cards and tinsel. In these the dwellers have some regard for cleanliness and a measure of self-respect.

The old church near the center of the village rises prominently above the surrounding structures. Standing upon an eminence, it gives prospect of the country far and near, and is itself first beheld by the approaching traveler. Its portal, shaded by graceful pepper trees, looks



A LANDSCAPE ON THE HACIENDA DE CEDROS Photo by J. E. Kirkwood

The *palma* from which fiber is obtained. "This estate, the Hacienda of the Cedars, is 70 miles long by 60 wide, a domain about equal in area to the State of Connecticut. Although much smaller than some of the other haciendas, it nevertheless constitutes a considerable property, being 2½ million acres in extent. From center to circumference is a day's journey or more, and the proprietor, when he visits the outlying portions of his estate, prepares for a journey of days or weeks with coach-and-six and attendants and much of the air of a petty ruler" (see text, page 563).

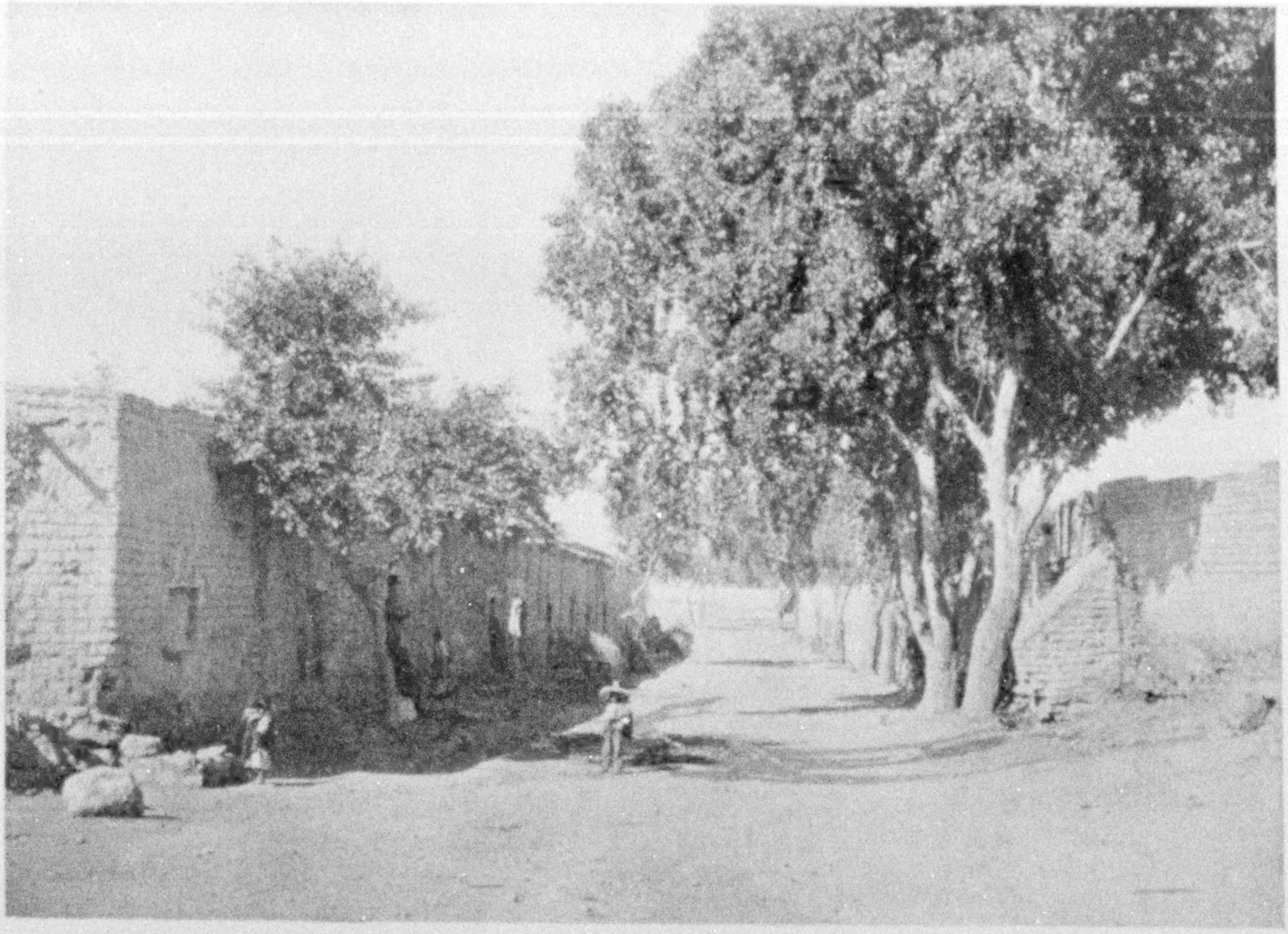
out upon the little plaza, witness of its people's life, at work or play. Rugged in its strength and severe in its architectural simplicity, it stands a refuge, spiritual and temporal.

The arched and cemented roof, walled round by a crumbling parapet, the loopholes of which still show, is reached by a flight of steep and narrow steps leading up on the outside. The walls of stone, 4 feet in thickness, are pierced by deep embrasured windows, which, being few and small, light but dimly the appropriately decorated interior. Guarding the entrance to this sanctuary are ponderous doors, whose mortised timbers are studded with huge wrought nails having heads the size of one's palm.

Through the center of the yard a walk of flat stones leads up to the door, where the hollow-worn threshold speaks of the generations of devout people who have come and gone these 200 years. Within a large mural painting depicts the life and death of the martyred priest who long ago ministered to the charcoal-burners at Mazapil. Protesting against the oppression of these poor people, who then were slaves at the hands of their Spanish taskmasters, he aroused the anger of those whose greed he sought to check and lost his life at the hands of hired assassins.

THE MANOR HOUSE

Across the open plaza stands the casa grande. This relic of manorial pretensions of more prosperous days, with the buildings adjoining and appertaining to



A STREET IN THE VILLAGE OF CEDROS Photo by J. E. Kirkwood

On the left the peons' quarters, on the right the garden wall. "The homes of peons are either huddled in groups or scattered about the outskirts, and, though mostly permanent structures built of adobe, they are arranged in no definite order, but are set up wherever chance or the convenience of the builder dictated" (see text, page 566).

it, rambles over several acres of ground. Its front elevation, like that of many other mansions of the land, is innocent of any suggestion of artistic effort, and rises a plain, white-washed wall, broken only by the deep-set and securely grated windows and the heavy doors. It rises 30 feet to the parapet, providing two stories in the main building, though its adjoining structures have but one. Before recent improvements substituted a stronger wall for the old parapet, loopholes were still visible here and there. The doors of the main entrance, like those of the church, are ponderously built of hewn timbers and, being barred, offer effectual resistance to any seeking entrance by force.

There seem to be no available records of the building of this house. A date legible upon one of the beams within is 1731, which appears to be the date of certain repairs. The building, however, in essential respects seems as good as when first built. The lower walls are nearly 4 feet in diameter, though 2 feet, the usual thickness of adobe walls, afford ample protection against the burning heat of summer.

Notwithstanding the prejudice which might naturally arise against sun-dried brick as a desirable or durable building material, they have been immensely useful in many forms of construction over a large part of the North American continent. They came extensively into service, probably, through the force of necessity, where other materials were scarce or difficult to work, but they have abundantly demonstrated their usefulness. It would be difficult to imagine houses better adapted to the hot, dry climate of the plateau than the adobe, properly constructed, which, when well finished, is clean and may be even beautiful in design.

A PRETENTIOUS HOME

Entering the mansion by the main door, a portal large enough to admit a load of hay, one finds himself in a tunnel-like passage leading through to the inner court, or patio. On either side of this passage are doors, and farther on a stairway leads to the upper rooms, though originally they were reached through a trap-door by means of a ladder, which was drawn up at night.

The patio itself, some 60 or 70 feet square, is designed on the simple lines of some of the more primitive and isolated places, and from this court, after the usual fashion, doors open into various rooms. In the center of the patio a well furnishes water for the household, a flower bed occupies a cement basin of ample size, and a grape vine scrambles over an arbor of rude poles.

Entering a door from the passageway, one finds himself in a large *sala*, or parlor, with tinted walls and tiled floor. The tiles, perhaps at one time level, are now uneven after nearly 200 years of use. They are about 8 inches square, hard and smooth of surface. Such formed the chief flooring material in this and other houses of the time. Hewn timbers extend from wall to wall, supporting the floor above. The origin of these and much larger timbers in the construction of the buildings is a matter of some conjecture. Although it is reported that originally a cedar grove of considerable size grew here about the springs, there is at present no evidence that such a stand of timber formerly existed, except the few aged and decrepit junipers scattered along the feeble watercourses.

MUNITIONS OF WAR

A smaller room opening off the *sala* is an arsenal. Rows of Winchesters are stacked along the wall, some of recent, others of older, models; also some ancient muzzle-loading pieces of ponderous weight. Revolvers and pistols of ancient pattern complete the assortment, along with a small supply of drugs and medicines.

Passing out at the other end of the *sala*, one enters a corridor, at the far end of which glazed doors give access to the *huerta*, or garden. Off this corridor rooms open to the right and left, but, as none of these are of special interest, attention may now be turned to the kitchen, entrance to which may be gained from the patio. This room, 20 feet square, is lighted during the day through the open door.

In the center of the room was originally a circular, altar-like structure of stone or adobe, 6 feet across, from which arose a huge conical chimney, supported by several legs forming the sides of as many arches. Upon this bench, prior to the advent of the modern range, cooking was done by the open fire. From the kitchen food was carried by an out-of-door route to the dining-room, there being no connecting passage.

Adjoining the main building a long row of lower structures flanks the plaza. Among the several doors along this row two are noteworthy—one gives entrance to the jail, the other to the wine cellar. The juxtaposition of these two institutions probably was not meant to convey any idea of their logical association, but that one of these sometimes contributed to the other there can be no doubt.

A GREAT WINE CELLAR

The commodious vault of the wine cellar is reached through several outer rooms containing the various appurtenances concerned with the manufacture of wine. Huge fermenting vats built of adobe and lined with cement, each capable of holding several cartloads of grapes, stand close by the press in one of the outer rooms, and in another a still was built close by the steps which lead under a high and heavy archway down to the cellar. The cellar itself, about 100 by 40 feet, is divided lengthwise by supporting arches of the same masonry which figures in the construction of all the buildings.

Along the walls stand rows of huge casks, most of them now empty, but some containing a few gallons of the more recent vintages. Midway of the cellar a well reaches down to a flowing spring, whence water was drawn for uses in connection with the winery. As indicated above, not only fermented, but also distilled, liquors were manufactured here,

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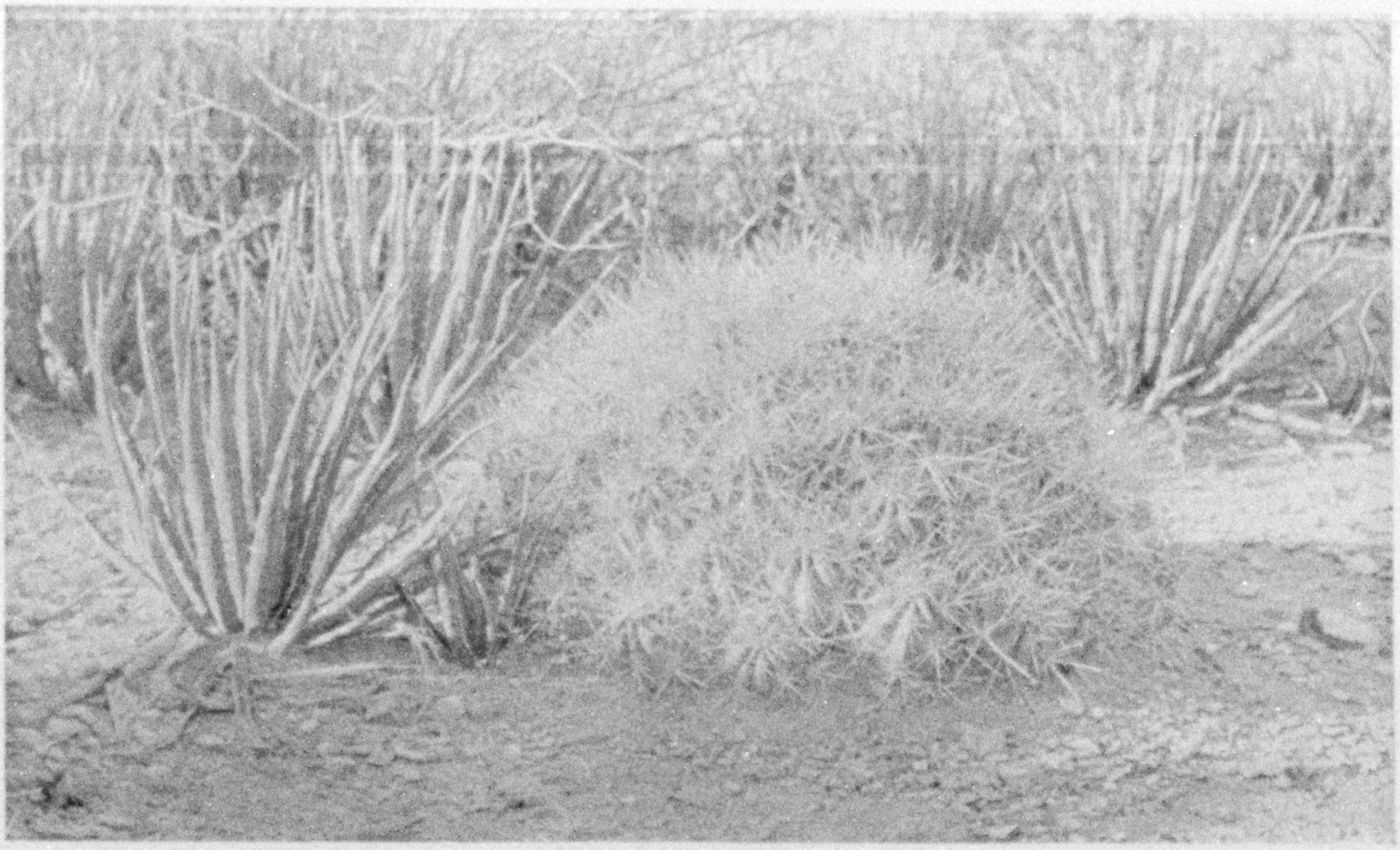


Photo by J. E. Kirkwood

LECHUGUILLA PLANTS (THOSE HAVING NARROW LEAVES) AND CACTUS ON THE HACIENDA DE CEDROS

This and page 567 show the typical vegetation of the region. The *lechuguilla* is about 18 inches high. "Two kinds of fiber are produced in large quantities. One is from the leaves of a yucca-like tree commonly called by the natives *palma*, and the other goes usually by the name *lechuguilla*, and is derived from a small relative of the century plant, exceedingly abundant throughout the northern half of the Republic. The fiber is soft, pliable, and strong and is much used for cordage, matting, bags, etc. Some of the fiber is manufactured locally, but the most of it finds a market in New York and other foreign ports" (see text, page 577).

wine and *aguardiente*, a kind of brandy, being the chief products.

From the wine cellar one may enter the garden pertaining to the casa grande. This garden, about 40 acres in extent, is surrounded by an adobe wall 10 feet in height, forbidding entrance to those not of the casa. Given somewhat to arbors in the vicinity of the house and to walks roughly paved with cobblestones, where are also fig and pomegranate trees, cottonwoods and pecans, the larger part of this extensive garden was formerly utilized in the growing of grapes.

MOVING A GARDEN

We are told that the earth of this garden is not its original soil, but was carted onto the area to provide the necessary conditions for the growing of crops, and the story has at least the appearance of truth, inasmuch as the soil within is different from that immediately without the garden wall and resembles the alluvium of the plain below. This light and dusty soil is heaped into ridges inclosing small areas for the purpose of irrigation, made possible by the presence of a small stream which enters the inclosure and supplies a small reservoir surrounded by tall canes. The overflow from this tank never goes very far, but is quickly absorbed by the thirsty ground; only when the gate is opened does the stream suffice to reach the most remote limits of the vineyard.

Following one of the rudely paved walks leading from the casa, one descends a gentle slope to a high-walled inclosure. A low gate, swinging on rusty hinges, admits to a wide hall extending to right and left, from which, opposite the entrance, steps lead down to a large bath. Through an arched portal at the foot of the steps one may pass out into 5 or 6 feet of water in a pool about 30 by 50 feet. A ledge 2 or 3 feet wide surrounds

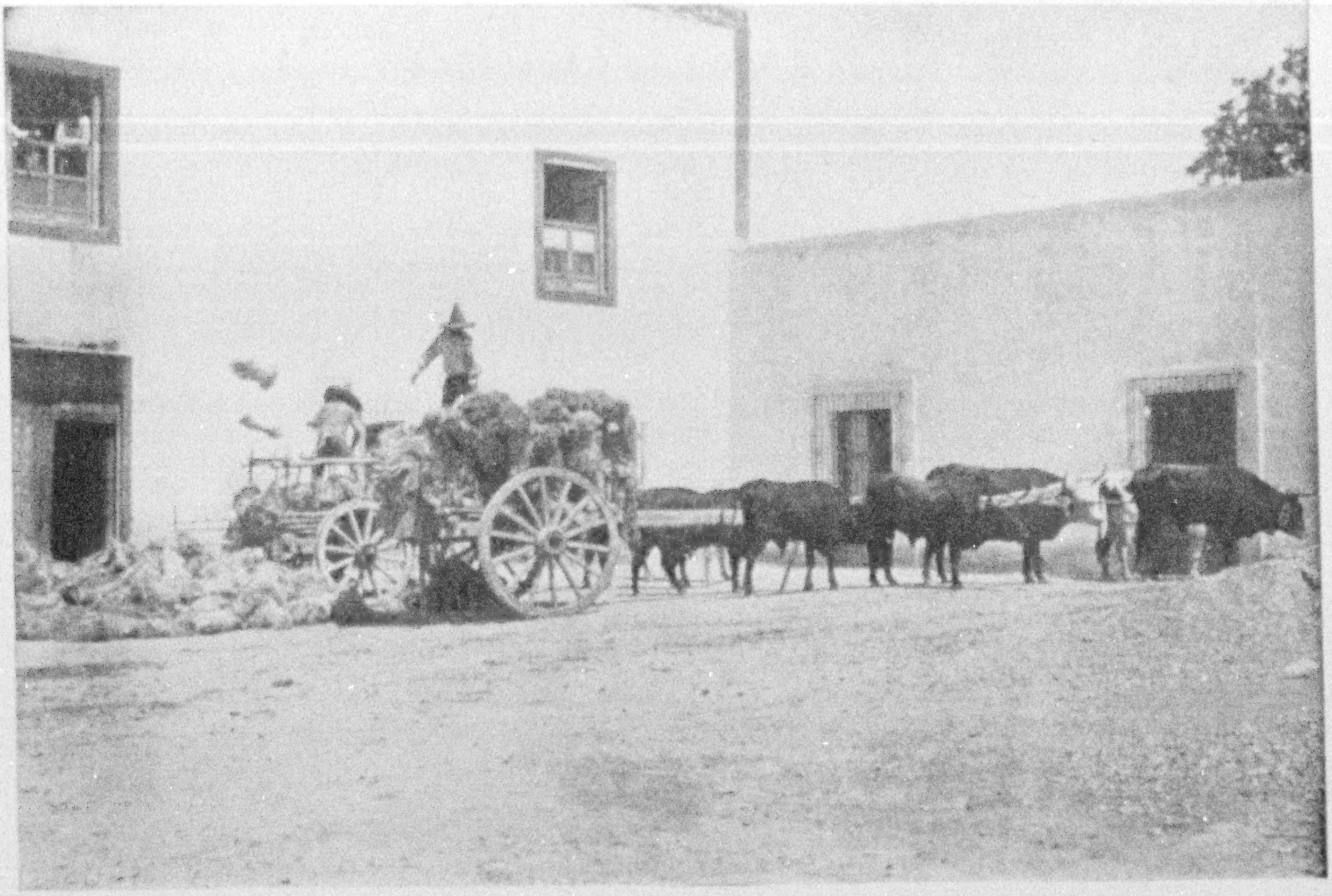


Photo by J. E. Kirkwood

UNLOADING FIBER AT THE HEADQUARTERS OF THE HACIENDA DE CEDROS

Peons work for months at distant stations on the property and are paid per kilogram when the fiber is delivered

the basin and connects with the broader landing on the side of the entrance. This bath is supplied by the same spring that passes beneath the wine cellar, the waters of which are led thither by a tunnel 100 yards long under 15 feet of earth and stone. This bath is cold, but another at some distance is warm and was a favorite resort. It also is inclosed by high walls and barred doors.

The village of Cedros holds about 500 souls and the casa grande is the center of its life. The "Large House" has always been the center of hacienda life. The establishment of the old haciendas upon the lines of a feudal barony was doubtless agreeable to the owners; but there were then, and also until recent years, conditions throughout the country which not only justified such a scheme of social organization, but made it a practical necessity. Unsettled and lawless as the land then was, infested by Indians and marauding bands of thieves, possession of the land was not only nine points in favor of the contestant, but the whole of the argument. It then behooved the proprietor of an estate to fortify himself and to secure his property against all who would wrest it from him.

MASTER AND SERVANT

To such, therefore, as he could offer protection and employment he came to be in the nature of a master, and such as enjoyed his favor and protection became identified with the property and attached to it as vassals. The law prohibiting a peon's leaving an estate while in debt to it practically made him a fixture, and this law, being still in force, makes his condition today little different from that of former times, though peonage has nominally been abolished.

Wages of the Mexican peon are about 37 cents a day, Mexican currency. Such wages practically insure his perpetual dependency and make it difficult or impossible for him ever to become independent of the property upon which he was born. This condition, which may be regarded as typical of a large section, if not of the

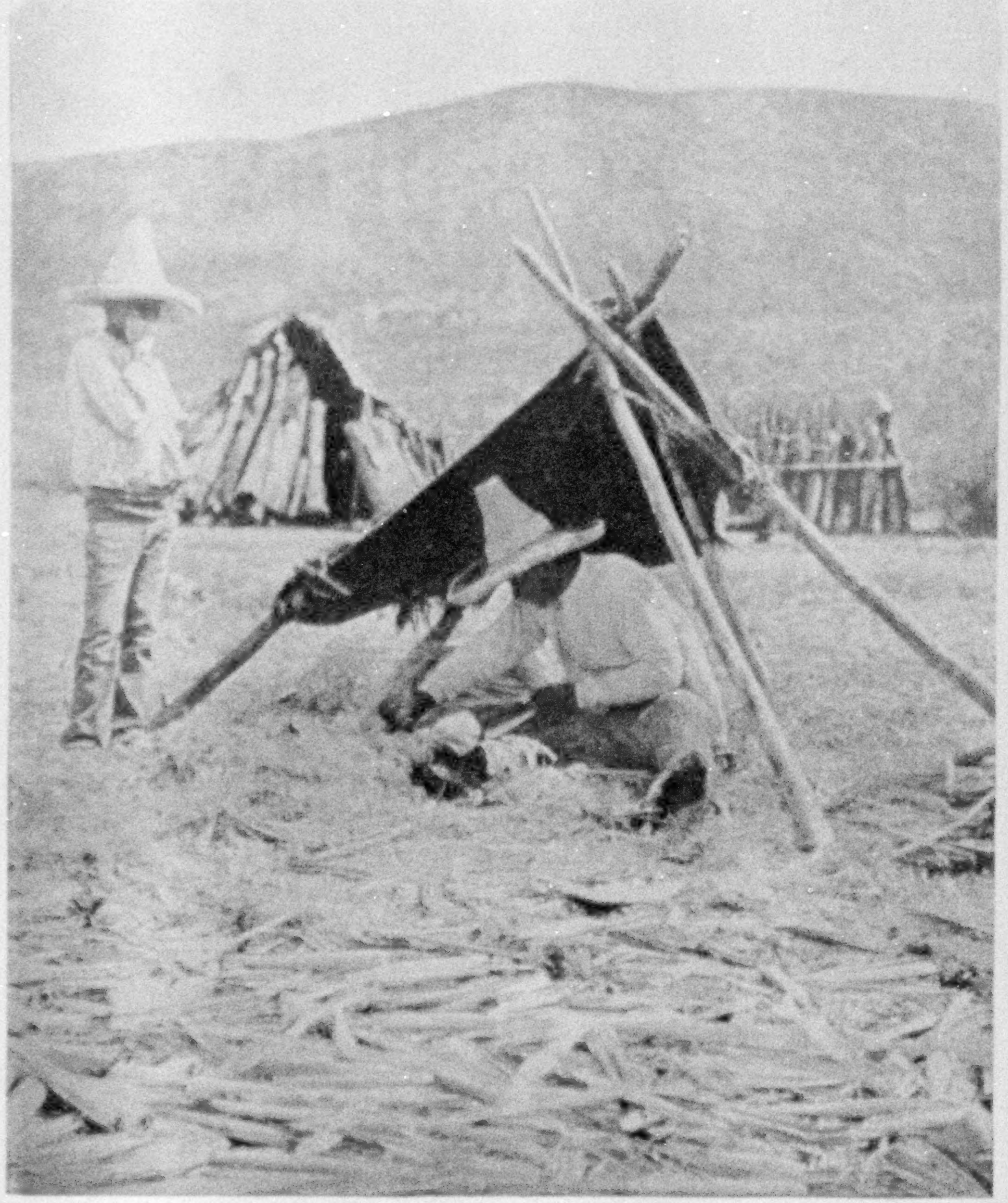


Photo by J. E. Kirkwood

STRIPPING PALMA FIBER

The central leaves of the cluster are soft and useless; such are rejected, as seen in the foreground. "The fiber is stripped from the leaves of the plants by hand. The leaves are long and narrow and the fibers extend from end to end. A workman seizes a leaf, lays it across a block of wood under a heavy dull knife, which is pressed upon the leaf as it is drawn through, and thus parts the fiber from the pulpy tissue. The leaves of the *palma* must be softened by steaming before they are stripped, but those of the *lechuguilla* may be cleaned at once" (see text, page 579).

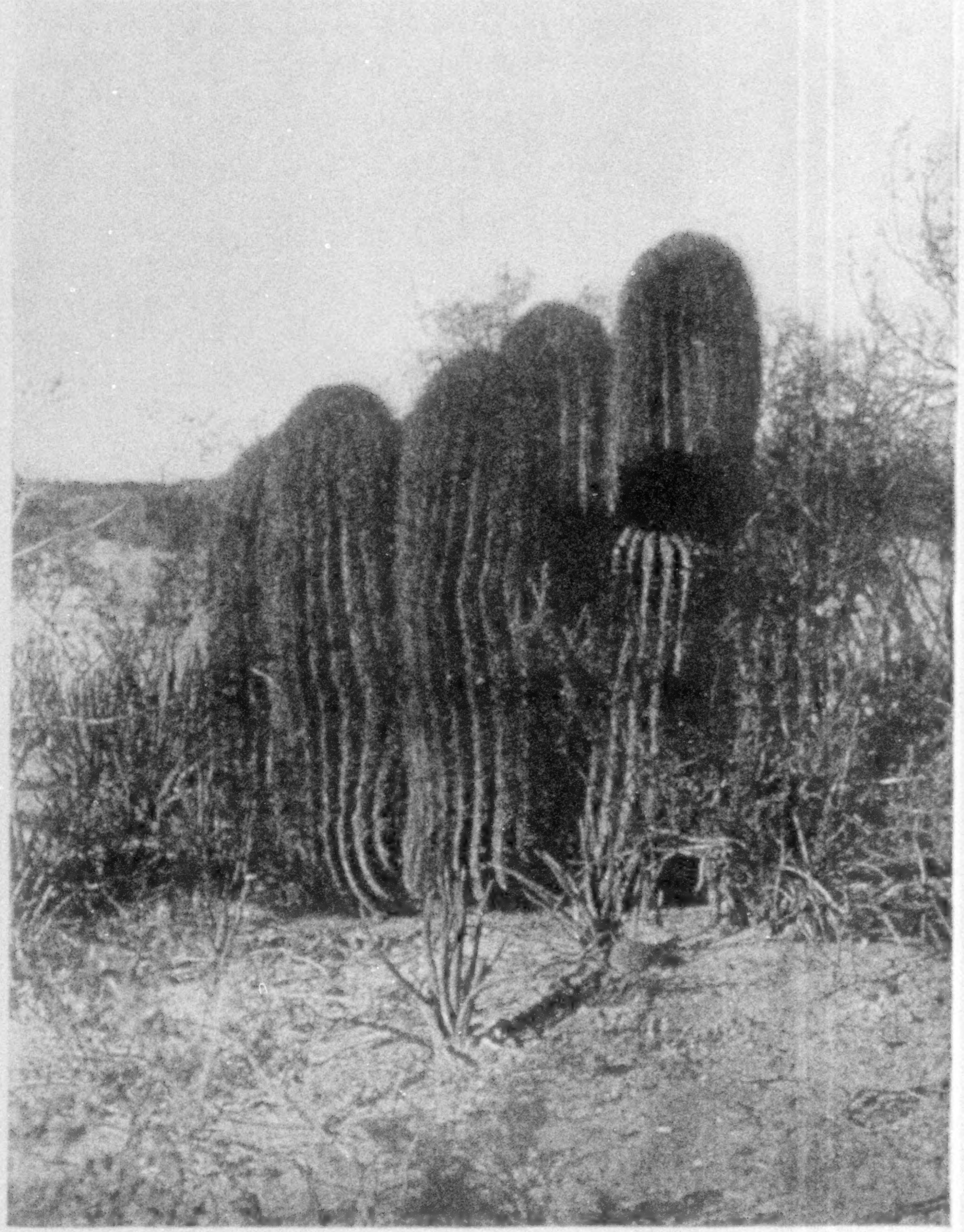


Photo by J. E. Kirkwood

A GROUP OF LARGE CACTI ON THE HACIENDA DE CEDROS, 4 TO 5 FEET IN HEIGHT whole of the country, is not compensated for by the fact that his wants are few and easily satisfied.

The peon is not ambitious; he is apathetic. But he has known no better life, and the lack of incentive to effort renders his mental and moral elevation a matter of greater difficulty than it otherwise might be. Taking into account the generations of servitude to which he has been subject, it is not strange that he evinces no regard for the morrow, except as a time to which all disagreeable things should be postponed, and no concern for any interests other than those of the immediate present.

THE CHILDISH PEON

He is essentially a child and is to be treated as such. His salvation is not in higher wages, which would soon be squandered, leaving him in worse condition than before, but first in education of the right sort, which will give him an outlook upon life and an incentive to effort. At the time when the writer knew Cedros it had just passed from the control of its Mexican owners into the hands of an American company, whose interest in the property was mainly in the exploitation of guayule, a small rubber-bearing tree of the desert. With the advent of the new management an effort was made to improve the condition of the peon and the quality of his service by the payment of higher wages, with the result that he worked less than he did before and no more often than was necessary to eke out a subsistence.

The people of the hacienda have little opportunity for education and rarely receive any instruction worthy of the name. A little teaching of the merest rudiments by instructors whose own education is exceedingly meager, with a dearth of books and a dark hovel for a schoolroom, is a fair representation of their educational opportunity; yet many of these people have large capacity for education and are eager to learn.

That the interests of the country would be better served if they were given reasonable educational opportunity seems obvious; but the status of the peon, historic and economic, militates against his receiving the consideration which he deserves.

Mixture of Spanish and Indian blood is common among the peon population. Many of these people are clean, intelligent, and industrious, but the reverse is more frequently true. In the small community at Cedros, where both extremes and many intermediate conditions obtain, it is pleasant to remember an acquaintance with a family of the better sort.

It would be difficult to find more genuine courtesy and refined taste than was habitually shown by the members of this household. They were comparatively uneducated, but their spirit and manners were apparently actuated by an innate sense of delicacy and propriety. And we found others of the same sort whose manners would put to shame many boasting higher education and culture.

DIVISION MANAGERS

For business management the large hacienda is divided into fractions (this hacienda into seven *fracciones*), over each of which an officer, *caporal*, presides, who administers his district and is responsible to the owner, or representative of the owner, the *administrador*. The peon labor is in charge of a *mayordomo*, who assigns the men their tasks, supervises their work, and gives account to his chief.

It is hardly necessary to say that the operations of a hacienda in their character and extent are controlled very largely by the natural resources of the region occupied. Mining, farming, and stock-raising are the principal enterprises of the haciendas on the plateau, while exploitation of native plants yielding fiber, rubber, liquors, etc., are also operations of importance in many places.

In most instances where the management of such business is in the hands of the Mexican and has not passed under the control of more progressive people, the methods employed are of the crudest sort. One observing their farming in the outlying districts might imagine himself living in the days of the Pharaohs. The field is plowed with a crooked stick drawn by oxen, with the yoke tied to the horns. Grain is cut with sickle and

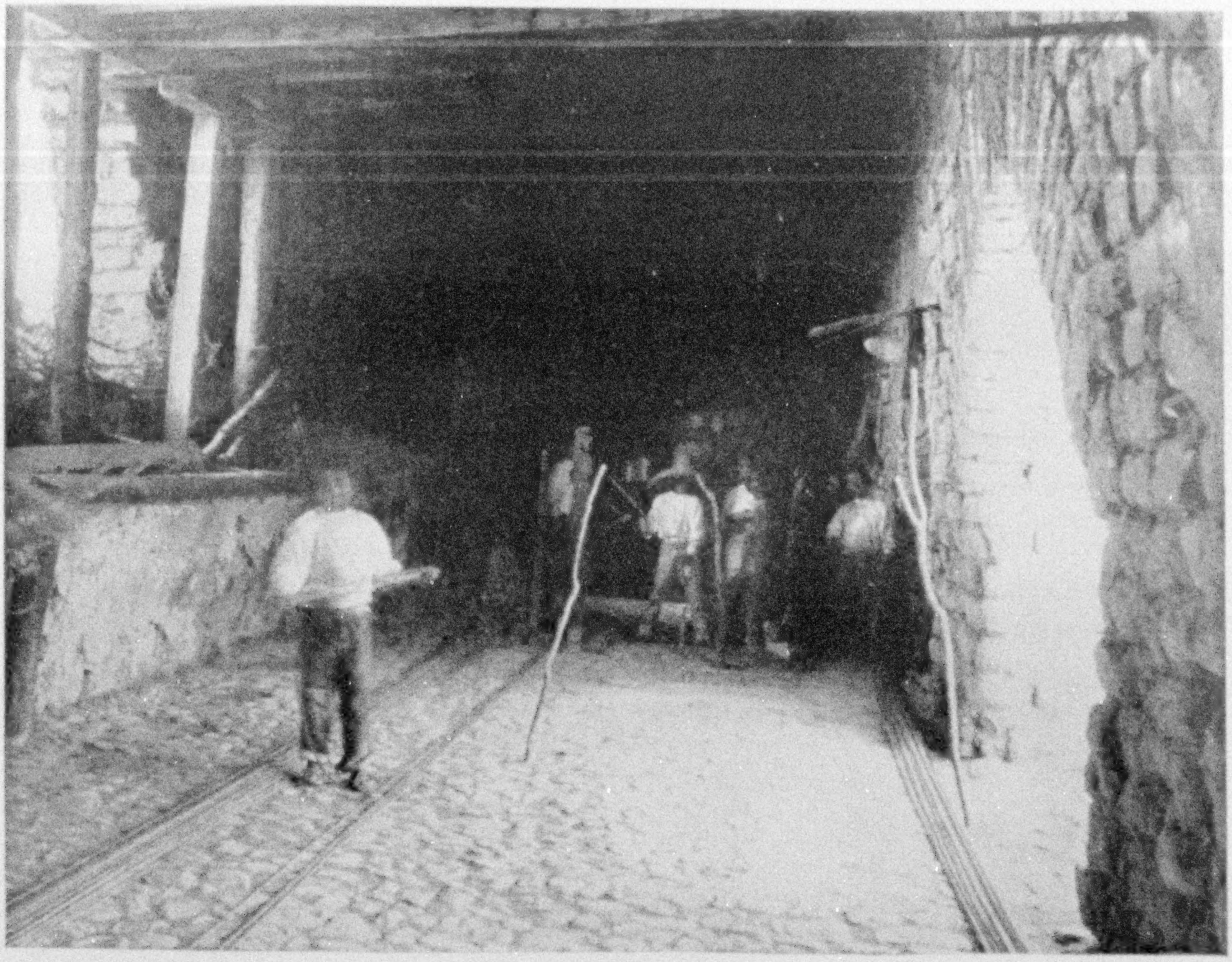


Photo by J. E. Kirkwood

ONE END OF THE ROPE-WALK AT CEDROS (SEE PAGE 584)

In this first picture the boys are in position to manipulate the spinning apparatus. One is winding a bobbin. In the picture on page 575 the spinners, the rope yarns, and the loom are seen.

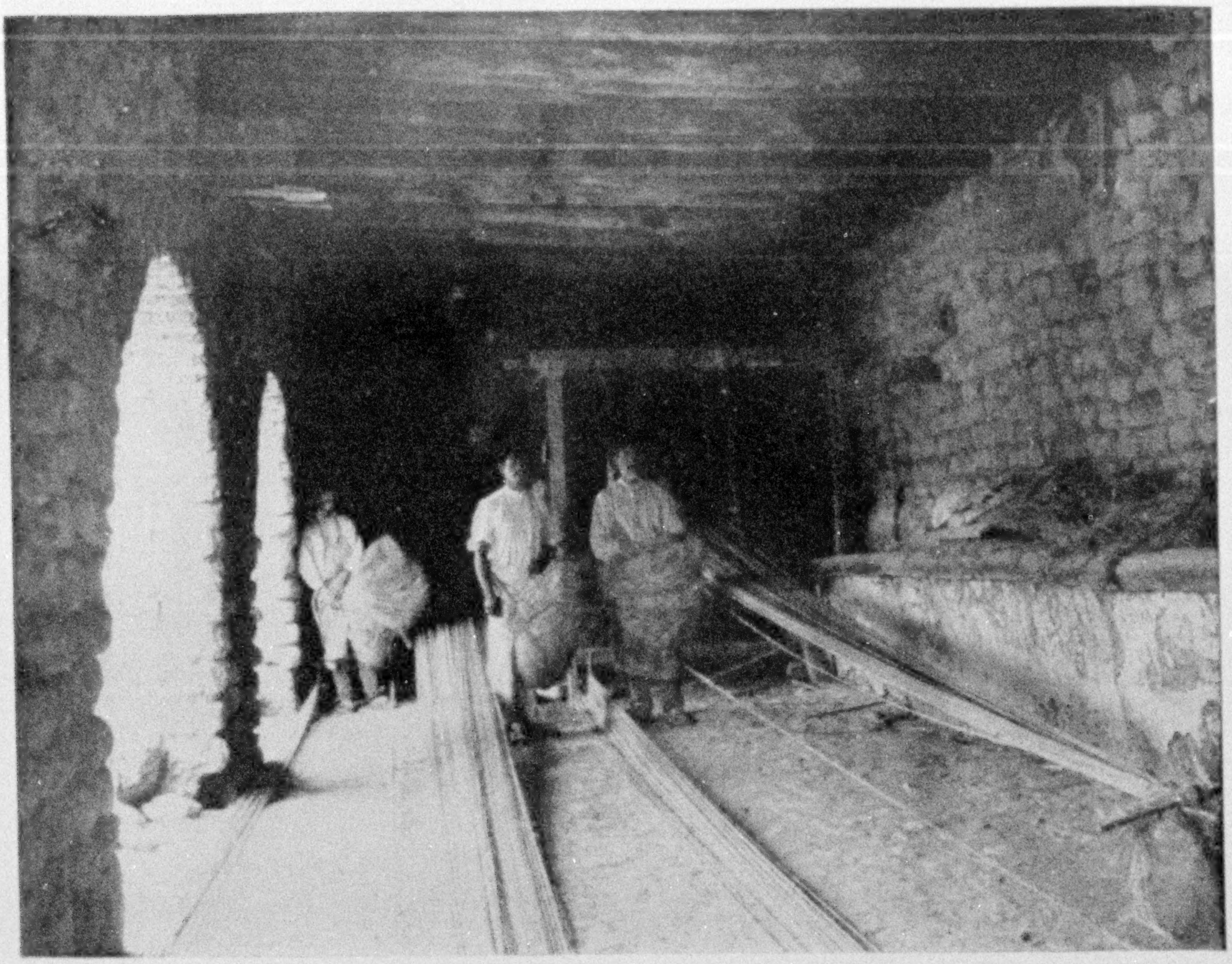
threshed by the hoofs of cattle, and corn is planted and shelled by hand. Rough and heavy home-made carts or the backs of men or burros are the most common modes of conveyance. The people seem to have no appreciation of improved farming implements. Often when improved implements are provided the laborers they discard them for more primitive methods.

The principal agricultural crop of the region is corn, but small grains, beans, squashes, and a few vegetables are also raised. Corn is the staple cereal for the poorer classes, furnishing material for tortillas and tamales; beans, chilis, and onions are easily grown and form some of the chief elements of the Mexican's diet.

MEXICAN CROPS

All of these crops are matured in the short season of the summer rains. July and August can usually be depended upon for heavy showers at not distant intervals, and the drainage of the uncultivated ground is so managed that the run-off is directed over the fields, which thus receive not only the rain which falls upon them, but also that which falls upon a considerable area of the adjacent land. Plowing and seeding are done mostly in July, and October is the month of harvest.

The fruits produced in this region from the few trees growing in the better-watered situations are the fig, pomegranate, avocado, grape, quince, and some inferior apples. One of the most common of the fruits of the country is the *tuna*, the fruits of the cactus of the prickly-pear kind, which grows to immense size and is a feature of almost every well-ordered garden and door-yard. There are a number of varieties of this fruit, most of them being larger than a hen's egg and



THE OTHER END OF THE ROPE-WALK Photo by J. E. Kirkwood

"By means of a string passed over the wheels a boy keeps them in rapid revolution, while the spinner, carrying a bundle of fiber suspended at his waist, backs away toward the other end of the walk, feeding out the fiber slowly to form the rope yarn, a hundred feet or more in length. These yarns may then be twisted into ropes or fed into a rude wooden loom, operated by foot power, and woven into matting" (see text, page 584).

purple, red, or yellow in color. This fruit is largely a food of the poorer class of people, who use it fresh or preserved. Pecans are largely planted for their nuts and for the ample shade which their crowns afford.

THESE DESERTS SUPPORT VAST HERDS OF CATTLE

On the haciendas of the plateau the business of stock-raising is one of the most important and one to which the natural features of the country are best adapted. Though semi-desert in its character and with few springs and fewer streams, yet large herds of animals are raised on these vast plains.

At the time of the transfer of Cedros to its American owners it was estimated that the hacienda supported a half million head of live stock of various kinds. So scant is the growth of grass in this land, however, that one is not impressed with it at sight as a stock range, but the stock get much of their forage from leaves and twigs of many species of woody plants in which the place abounds.

The problem of water supply is a serious one and is solved by the construction of numerous *represas,* or *tanques,* in which the drainage of the surrounding slopes is collected in the rainy season. These tanks are often many acres in extent and the water fills the shallow basin to the depth of 15 or 20 feet. A tank is formed by throwing a dam of earth or masonry across a valley at a convenient point, thus forming a reservoir into which are gathered the waters drained from a considerable area. In this way the herdsman makes good the lack of streams, for there is usually water retained in these

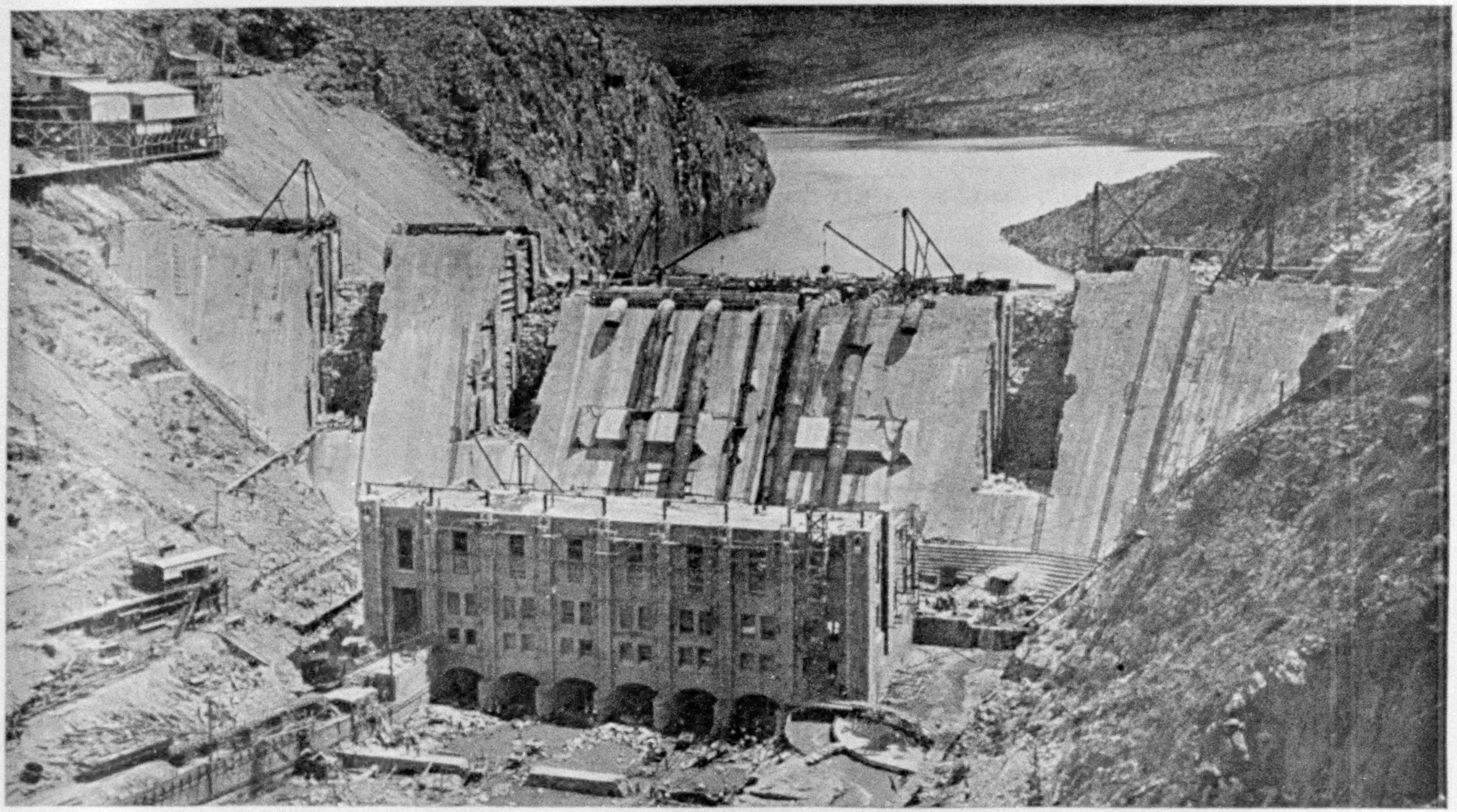


Photo by Shirley C. Hulse

MAIN DAM OF THE MEXICAN NORTHERN POWER COMPANY PROJECT AT BOQUILLA, NEAR SANTA ROSALIA, CHIHUAHUA

This huge project was forced to shut down in September, 1913, because of interrupted railroad communication and the impossibility of bringing supplies to the work. It had for a long time previously been the one construction work of size going forward in Mexico. This project will ultimately deliver electric power to the rich mining district of Parral, 50 miles to the south.

tanks throughout the dry season. If the tanks are located in the vicinity of steep drainage areas, they are likely to become silted up in a few years, thus necessitating an increase in the height of the dam or the selection of another site for a new one.

MINING PROPERTIES OF GREAT VALUE

Many of the haciendas are mining properties of great value. Copper, silver, and lead are the most abundant products. The mountains of the region are richly mineralized, and here and there on a high crest may be seen the outward evidence of the more or less extensive operations going on within the mountain. Some of these mines were worked by the early Spaniards and are still productive. On the Naranjera property, at San Pedro Ocampo, the hill is honeycombed with pits and galleries from which in the early days ore was taken without science or system, except as the richness of the rock indicated the most profitable direction for the expenditure of effort. The work is now carried on under modern methods.

In the village of Cedros stands an old smelter, typical of the methods formerly in use. It was built of adobe and the fuel used was charcoal, probably produced at Mazapil. Huge piles containing a half million tons of slag are close at hand, and contain, it is said, precious metals abundantly sufficient for a resmelting, so crude was the process then employed. The plant was also equipped for crushing the ore, as indicated by the presence of two large overshot wheels, supplied with water from the hillsides by means of a high aqueduct, the arches of which are still standing.

The ore was brought for miles on the backs of burros or in carts from the 150 mines formerly in operation on the hacienda. As no mines of any consequence, however, occur within 10 miles of this site the amount of labor involved in these operations was enormous.

On the opposite side of the village is a large inclosure, with extensive buildings, concerned with mining operations of a different sort. Though long in disuse, some of the old arrastras, or rude mills of stone for crushing ore, still stand, and the paved court and the old furnaces bear witness to the extraction of silver in former days.

EXTRACTING SILVER

An early traveler in Mexico cites the method then in use as involving first a thorough crushing of the ore by means of a heavy rolling stone, water being added in the meantime to form a thick paste. The paste was finally removed to an open square and deposited in circular beds about 10 feet in diameter. Salt or salt earth was then sprinkled over it, with a little pulverized pine bark or manure, and it was then thoroughly mixed by treading with horses or mules and allowed to stand three or four days. It then received a mixture of magistral and quicksilver in considerable quantities, was trampled as before, left for a day and trampled again, and so on from day to day until the metals were fully amalgamated. The mass was then transferred to an elevated vat and the water drained off. Water was afterward added in large quantities and the whole mixed until the amalgam settled, when it was filtered through canvas and made into triangular bricks, which were set up with spaces between under a copper bell. Charcoal was then heaped upon the bell and ignited. After 12 hours of heating the mercury and silver were separated and the latter removed pure.

FIBER PLANTS

But Cedros is no longer a mining hacienda. Other interests have superseded, and in late years the Campania Ganadera y Textil de Cedros represented stock and fiber as its chief sources of revenue. Fiber-bearing plants are one of the natural resources of the country, and the amount of fiber shipped from this hacienda alone amounts to over 90 tons annually.

Two kinds of fiber are produced in large quantities. One is from the leaves of a yucca-like tree commonly called by the natives *palma*, and the other goes usually by the name *lechuguilla*, and is derived from a small relative of the century plant, exceedingly abundant throughout the northern half of the Re-

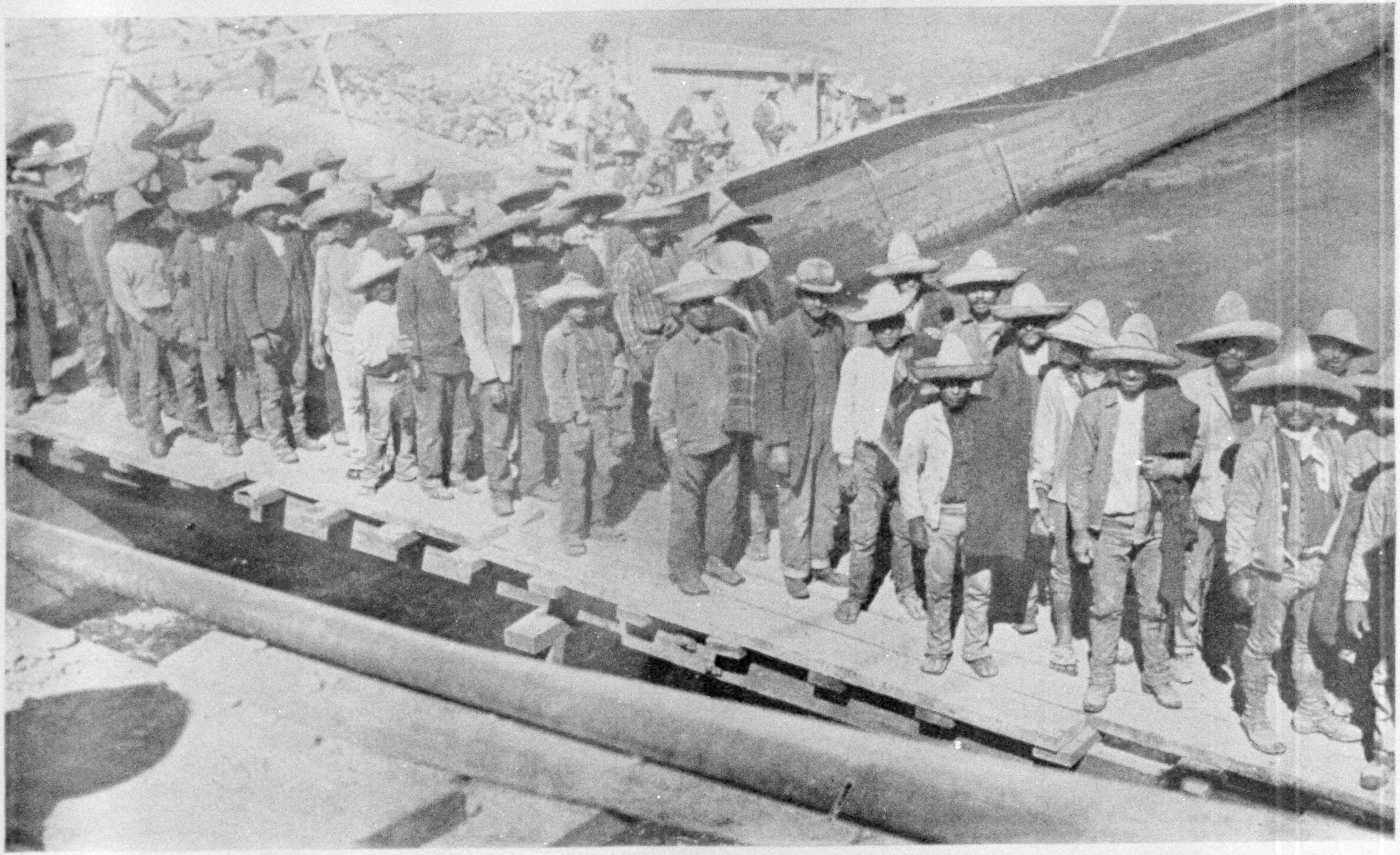


Photo by Shirley C. Hulse

LABORERS ON THE BOQUILLA PROJECT

With the exception of about 100 foreigners, the population of Boquilla was entirely Mexican, and the Mexican village numbered at times 7,000 people, of whom half or more were employed on the work

AN AMERICAN GIRL IN MEXICO — Photo by Shirley C. Hulse

Peggy loved to jump "Rosey" over anything in the way of ditches or arroyos that he could be made to tackle

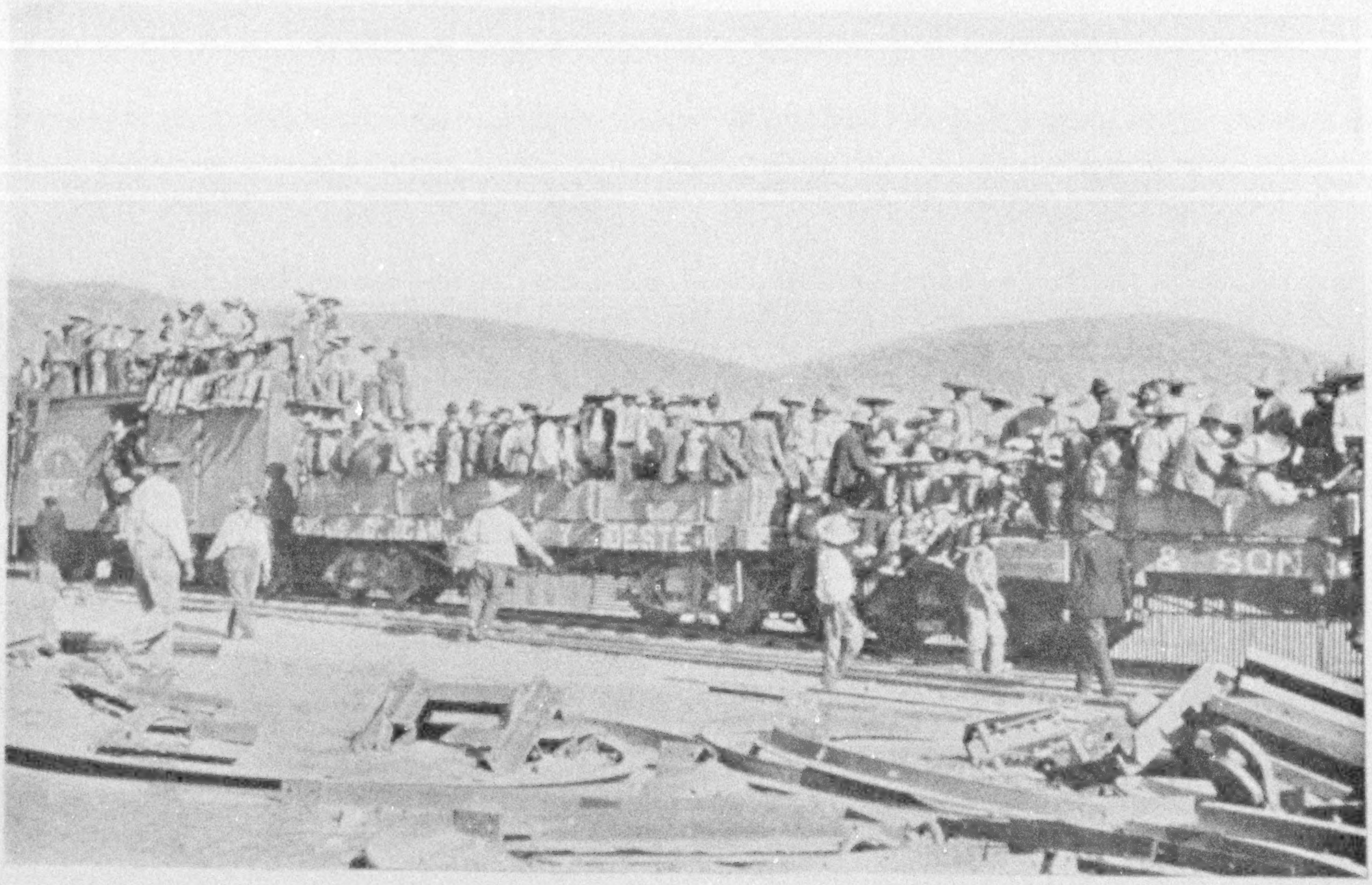
public. The fiber is soft, pliable, and strong and is much used for cordage, matting, bags, etc. Some of the fiber is manufactured locally, but the most of it finds a market in New York and other foreign ports.

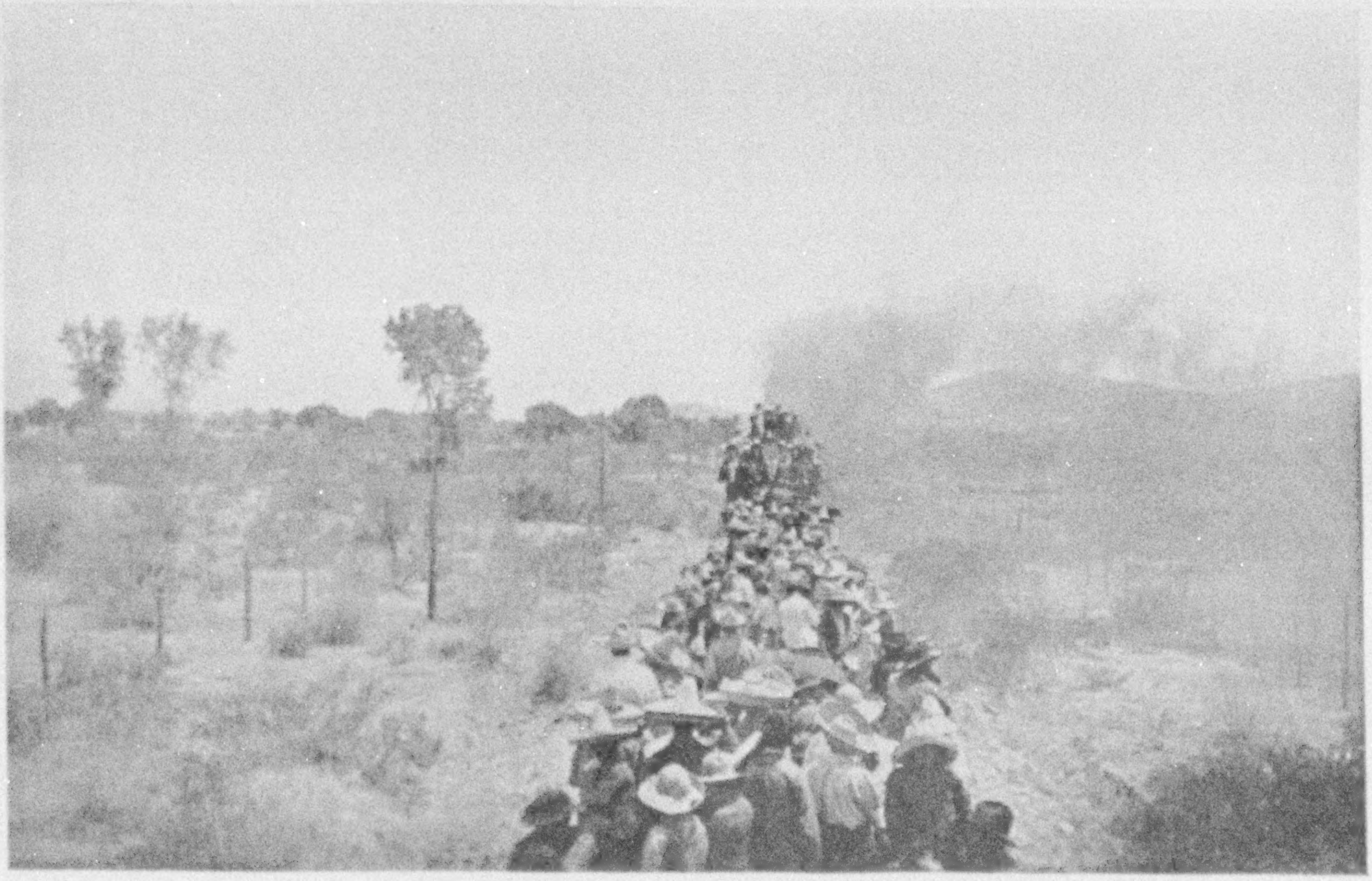
The fiber is stripped from the leaves of the plants by hand. The leaves are long and narrow and the fibers extend from end to end. A workman seizes a leaf, lays it across a block of wood under a heavy dull knife, which is pressed upon the leaf as it is drawn through, and thus parts the fiber from the pulpy tissue. The leaves of the palma must be softened by steaming before they are stripped, but those of the *lechuguilla* may be cleaned at once. It is a common sight to see great cartloads of this pale yellow fiber drawn into Cedros, where it is weighed out and the men paid according to the amount produced.

The articles made from these fibers are strong, firm, and compact, though somewhat coarse and rough. They are such articles as one sees everywhere in Mexico—articles very well adapted to the purpose for which they are intended. A kind of heavy matting, much used for floor covering in offices and similar places, serves its purpose well. Besides these articles, the fiber is used in the manufacture of various kinds of cordage, and much of it finds its way into brushes, of which a great variety may be found, both of home and of foreign manufacture.

THE ROPE-WALK

In one of the long buildings at Cedros is an old rope-walk. Here a part of the fiber of local extraction is manufactured. The machinery consists of three wooden posts, in which are set small wooden





Photos by Shirley C. Hulse

The company had, from Boquilla to the neighborhood of Santa Rosalia, a private railroad, and, owing to the conditions, it was impossible to restrict the riding of the people on this line. The Mexican peon rides on a railroad, should the opportunity offer, in much the same spirit that a six-year-old child rides in an elevator, and at times the company's traffic was seriously interfered with by the number of the passengers.

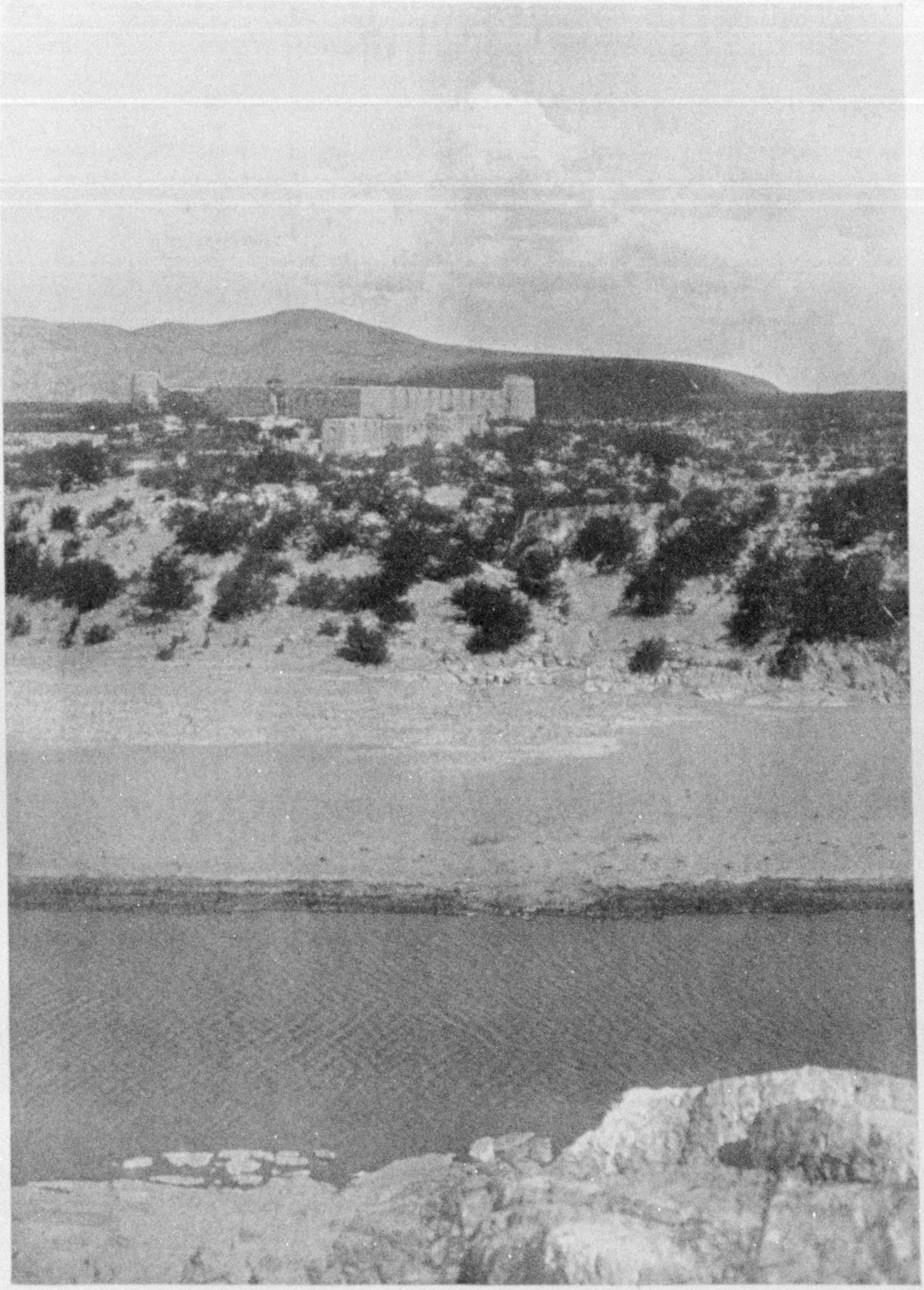


Photo by Shirley C. Hulse

AN OLD MEXICAN RANCH AND FORT NEAR SANTA ROSALIA, CHIHUAHUA

This ranch, which has lately been submerged by the waters of Lake Conchos above the dam at Boquilla, is said to have had a very stirring history as an Indian fort. The patriarch of this ranch had never heard of a camera nor a photograph and he was utterly at a loss when permission was asked to take his picture. At first he was made very nervous by the presence of the camera, but after everything had been explained to his satisfaction he was quite willing to pose for his picture, and his final comment on photography was, "Who could do such wonderful things but God or an American."

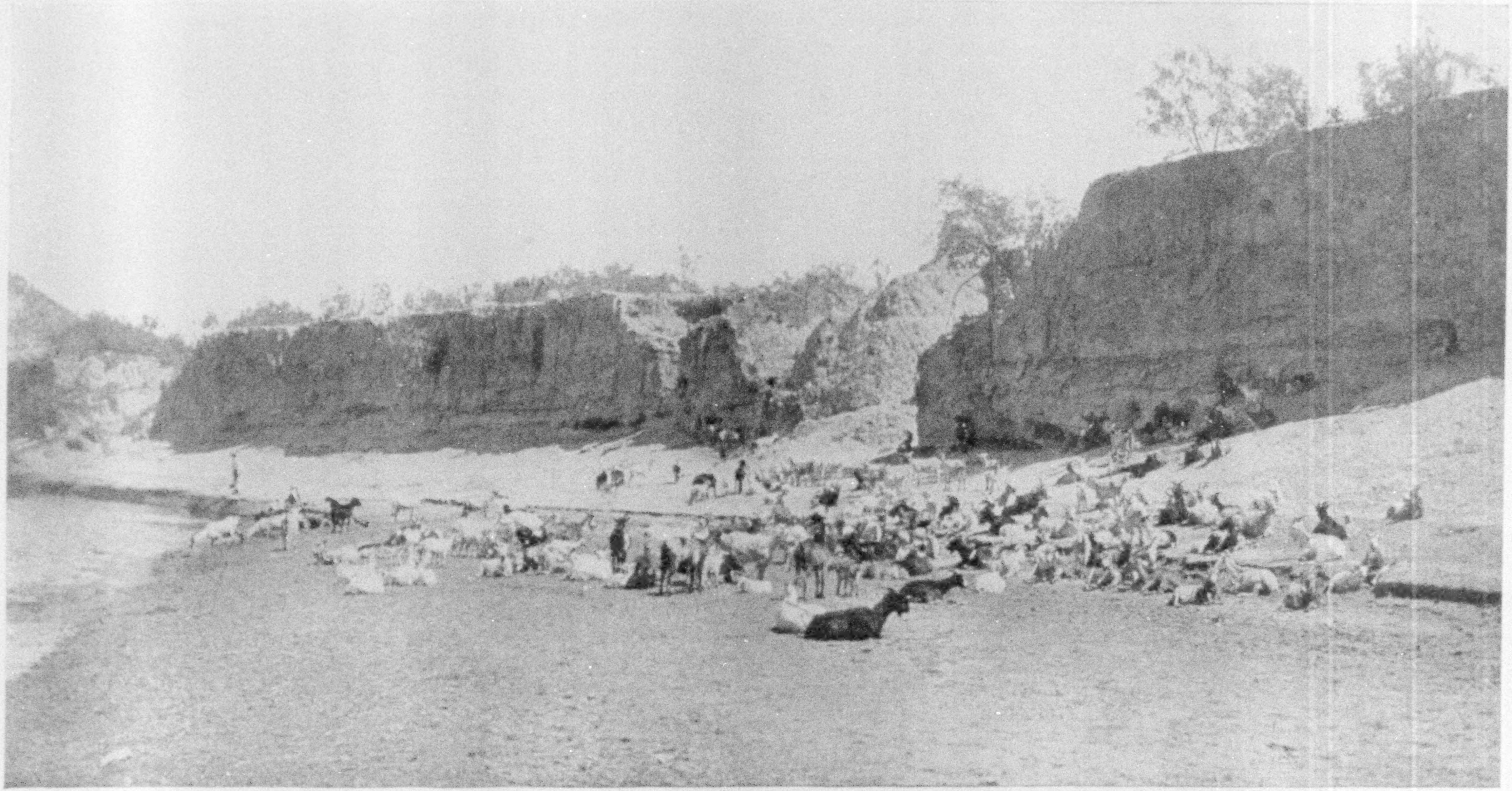


Photo by Shirley C. Hulse

CHARACTERISTIC SCENE IN THE MEXICAN STATE OF CHIHUAHUA, WHICH IS DIRECTLY SOUTH OF EL PASO, TEXAS

Goats are raised in very great numbers all through the barren parts of Chihuahua, and they thrive where nothing else, except possibly a burro, could pick up a living. They are valued for their milk and for their skins, which go by thousands into glove leather. The holes along the foot of the bank have been made by the goats licking at a salty stratum in the earth.

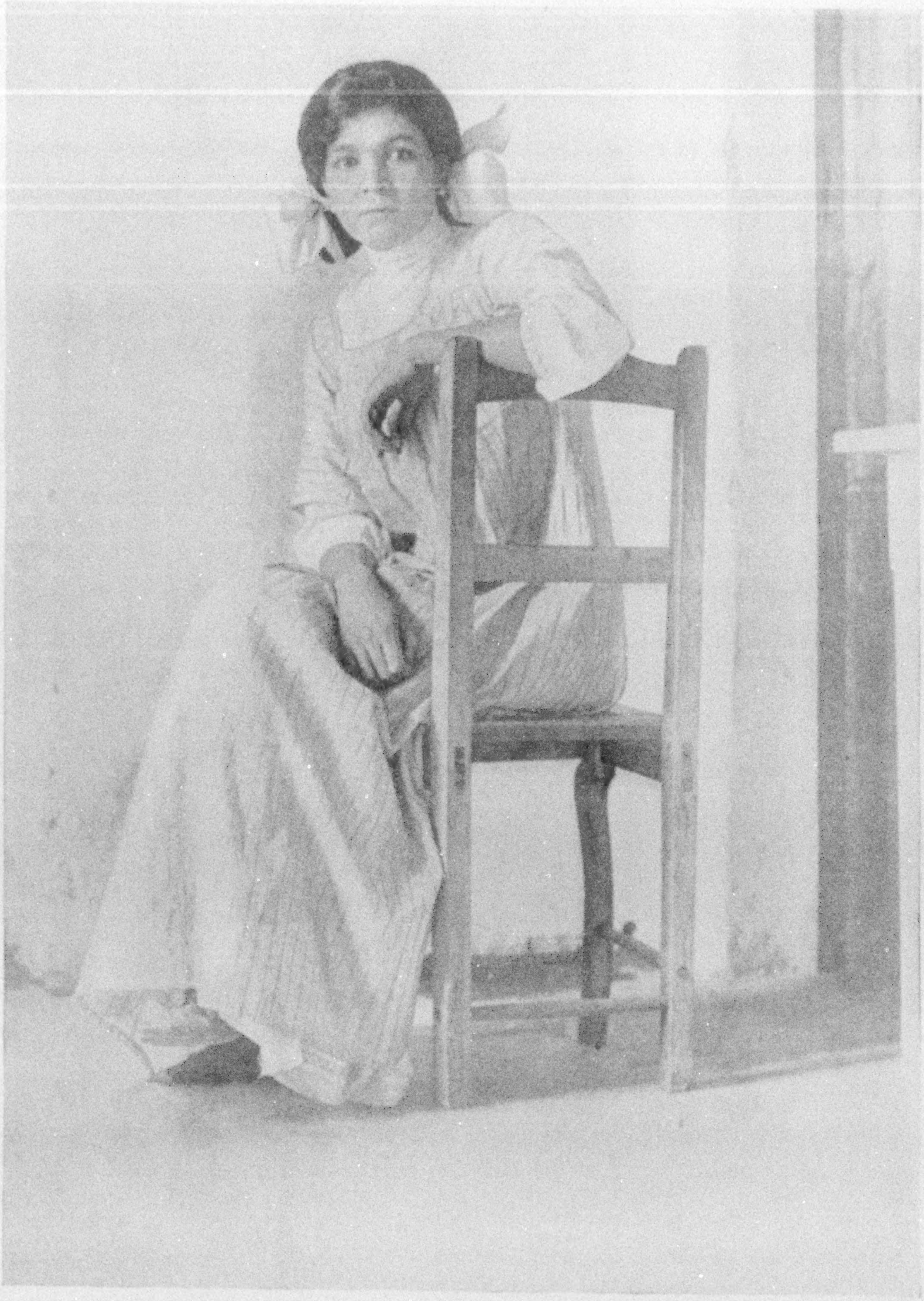


Photo by Shirley C. Hulse

THIS MEXICAN GIRL WAS FOR SEVERAL YEARS NURSE AND DOCTOR'S ASSISTANT AT BOQUILLA

She attracted the doctor's attention by her interest in the affairs of the hospital, and, from an ignorant, untrained beginning, she came in time to take full charge of the doctor's work during his illness or absence. She has upon occasion successfully performed surgical operations, herself giving the anesthetic, with no help but that of a mozo. She was absolutely cold-blooded and unfeeling in her handling of patients, perhaps to their ultimate benefit, and she has been suspected of slyly working off personal grudges upon the persons of certain sufferers on the operating table. This was, however, merely in a spirit of mischief and consisted only in getting an occasional harmless yelp and wriggle from the victim. In common with many of the Mexicans, she was exceedingly clever with her pencil, and she copied from American fashion-plates and made for herself clothes which would have done her credit on Fifth avenue itself. Also, she was the personification of meekness and industry, and it is to be hoped that she is a fair illustration of Mexican possibilities, granted the opportunity to learn and to advance.

wheels revolving at right angles to the direction of the walk. The posts are set at one end of the walk, with the axle of one of the wheels in each post projecting through in the direction of the walk, so that a wisp of the fiber may be attached to it.

By means of a string passed over the wheels a boy keeps them in rapid revolution, while the spinner, carrying a bundle of fiber suspended at his waist, backs away toward the other end of the walk, feeding out the fiber slowly to form the rope yarn, a hundred feet or more in length. These yarns may then be twisted into ropes or fed into a rude wooden loom, operated by foot power, and woven into matting.

There grows extensively over the tableland a small desert tree, less than 4 feet in height, with silvery, grayish leaves. It grows often as the dominant plant over considerable areas of the calcareous foothills, where it gives an aspect to the vegetation similar to that of the sage-brush areas of our western plains. This plant is widely known as the *guayule*, and its product, a kind of rubber, has been an item of large commercial interest in central Mexico during the last decade.

Although it was known long ago that the plant produced rubber, its profitable extraction has been a matter of only recent years, and now on many of the haciendas the cutting of *guayule* is a thriving and remunerative business. The plant is generally uprooted, regardless of conservation principles, bound into bales, and shipped to factories in the cities. About 10 per cent of the dry weight of the tree is gum, which is separated from the tissue by grinding and extraction by solvents or by mechanical agencies.

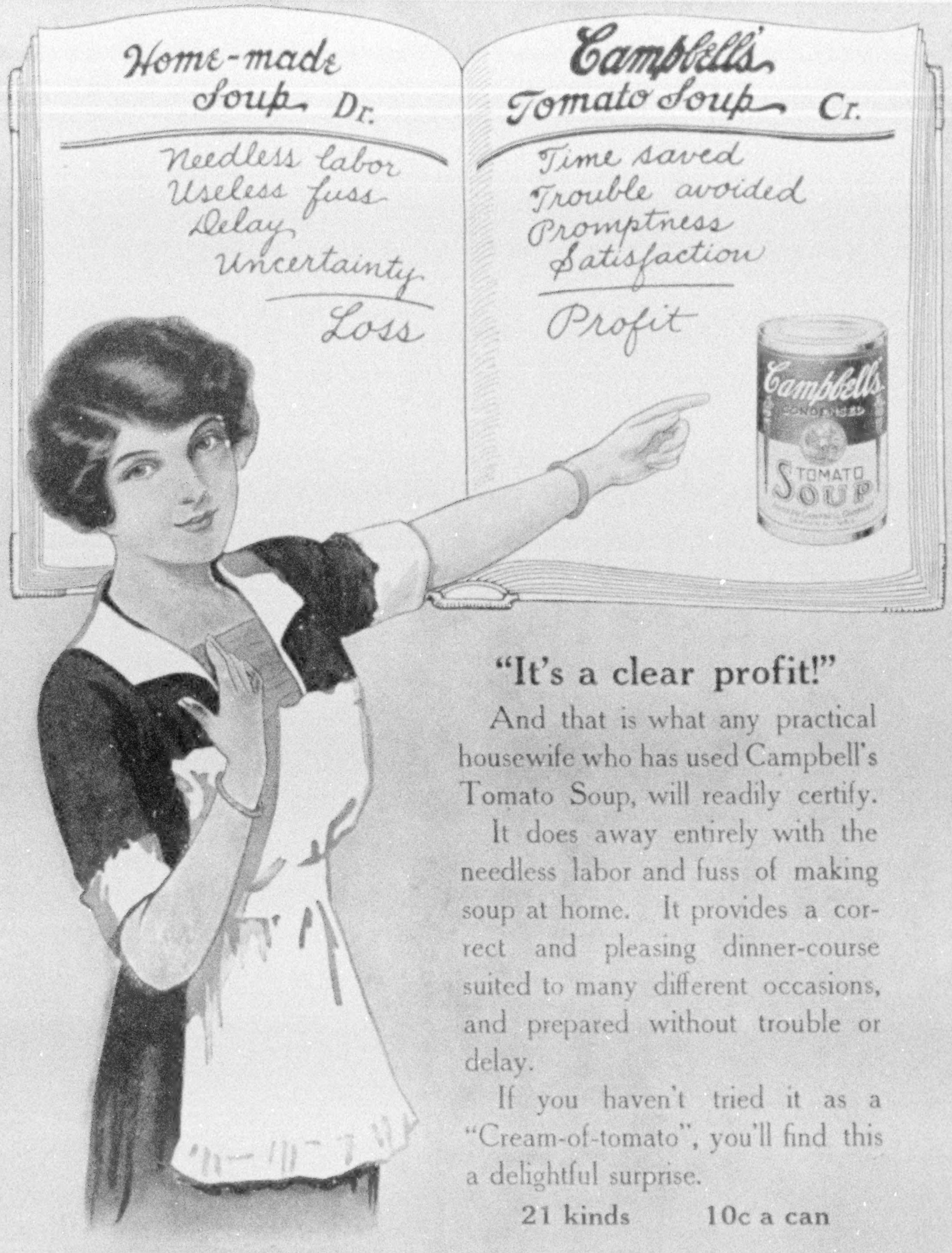
THE DAYS OF THE HACIENDA ARE NUMBERED

Various other activities of greater or less magnitude and importance are features of the hacienda life, much as they have been since the first settlement of the country. Where the railroads have penetrated and foreign capital has entered, they feel to some extent the influence of the world's progress and the march of events. At the best, however, they are isolated and provincial, living in the distant past, preferring old customs, manners, and dress, and tenacious of indolent habits, the rich and the poor alike.

The days of the old haciendas are numbered. Such institutions cannot long resist the pressure of the times. Capital is insistent for opportunity where there is profitable investment. Colonization enterprises in different parts of the country have already secured large areas and divided them into small tracts. Revolutions can only temporarily delay such development.

The best leaders of the Mexican people are realizing that one of the great needs of the nation is the free use of the land and the building of homes. Whatever the outcome of the present strife, there awaits a period of reconstruction in which the disposition of the hacienda must have a large share.

Mr. Robert E. Coker's article, "Wealth of a Rainless Coast," noted on pages 514 and 515, was originally scheduled for this month's issue, and the pictures given to the engraver some months ago, to be printed with the bird series in colors. In view of the great demand for information about Mexico, it has been deemed expedient to temporarily withhold Mr. Coker's interesting article to admit the Mexican material.


Home-made Soup Dr.
Needless labor
Useless fuss
Delay
Uncertainty
Loss
Campbell's Tomato Soup Cr.
Time saved
Trouble avoided
Promptness
Satisfaction
Profit
Campbell's
Condensed
Tomato
Soup

"It's a clear profit!"

And that is what any practical housewife who has used Campbell's Tomato Soup, will readily certify.

It does away entirely with the needless labor and fuss of making soup at home. It provides a correct and pleasing dinner-course suited to many different occasions, and prepared without trouble or delay.

If you haven't tried it as a "Cream-of-tomato", you'll find this a delightful surprise.

21 kinds 10c a can

Campbell's SOUPS

LOOK FOR THE RED-AND-WHITE LABEL

Quality
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How Joe Jefferson kept himself from Going Stale on Rip Van Winkle

After repeating the familiar words and actions thousands of times, how could he come to each new performance with zest and thrill? He was asked to explain it; and this is what he said:

"I realize at each performance that I face a number of people who never saw Rip before, but who have heard a great deal about him; and I play to them; and I must do my very best to satisfy their anticipations."

Likewise, in making every new batch of varnish, we realize that a number of people, who have heard a great deal about the *Quality* of *Murphy Varnish,* will make their first trial of our goods with this batch—and they must be satisfied.

The Varnish
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FRANKLIN MURPHY, President
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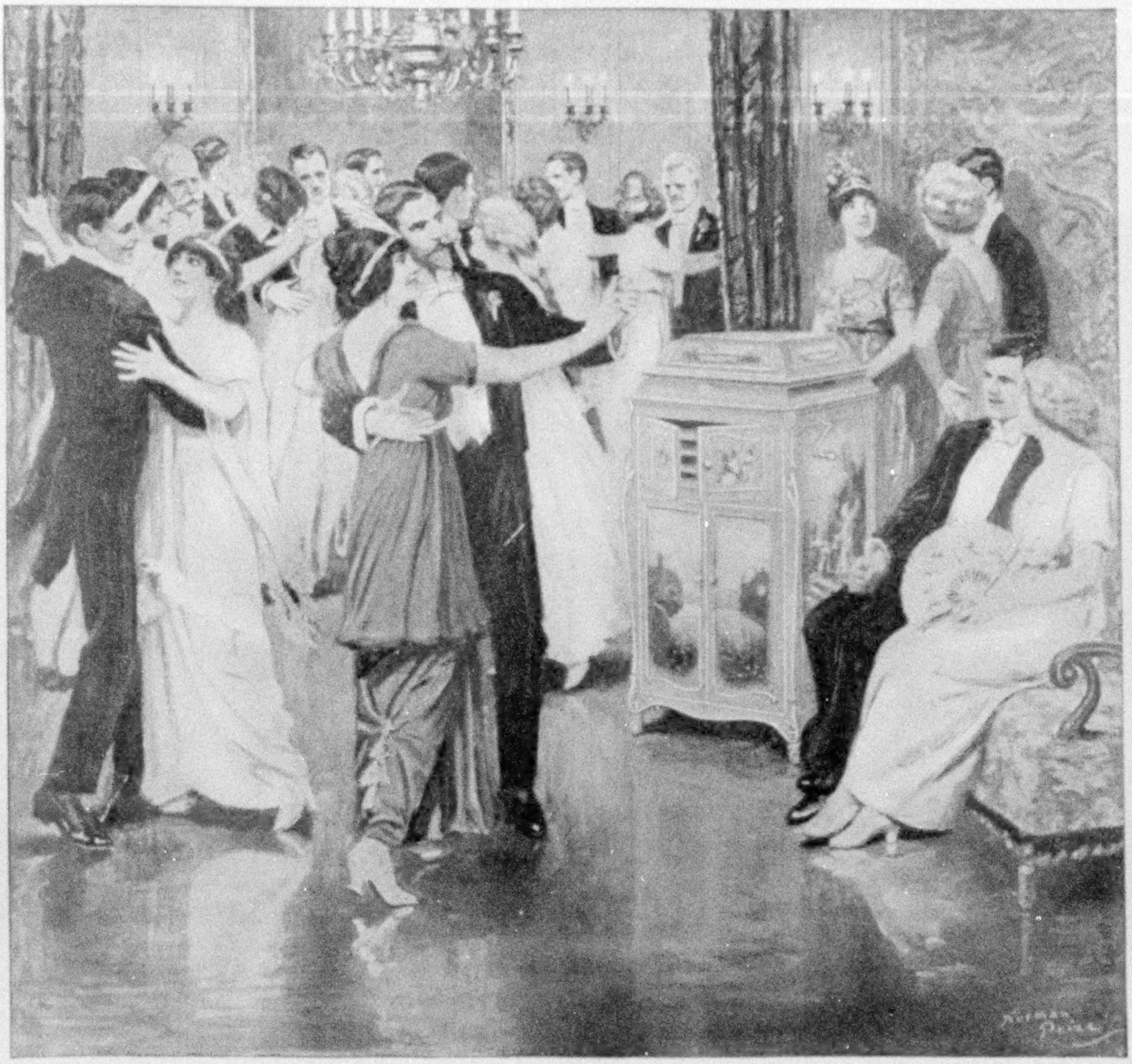

Dancing is delightful to the music of the Victrola

Every one enjoys dancing to music of such splendid volume, such clearness and perfect rhythm—and the Victrola plays as long as any one wants to dance.

The Victrola brings to you all kinds of music and entertainment, superbly rendered by the world's greatest artists who make records exclusively for the Victor.

Any Victor dealer will gladly play the latest dance music or any other music you wish to hear. There are Victors and Victrolas in great variety of styles from $10 to $500.

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Berliner Gramophone Co., Montreal, Canadian Distributors

New Victor Records demonstrated at all dealers on the 28th of each month

XUM

Type your bill. Stop! It is footed—total proved

This latest Remington time-saver ends a needless waste of clerical time

From now on bills and statements will be written out and footed up simultaneously.

One operation does it.

The typist inserts a bill-head in the Remington Adding and Subtracting Typewriter.

She copies the items.

But look!

Every time the numeral keys are pressed the figures are both typed and *added*. The bill *automatically* foots—with cold-steel accuracy.

If the typist prints a wrong total, an error-signal at once calls a halt.

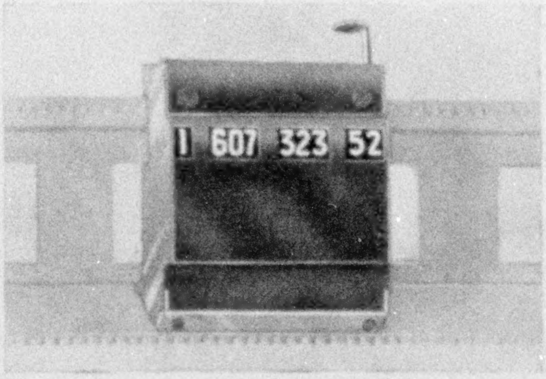
The footings will be as correct as though proved by a certified accountant.

The bill—neatly typed and complete—is mailed without a moment's time spent on addition, subtraction, or total-proving.

* * * *

This marks a tremendous advance in billing and accounting.

This device shows the footings



Hereafter, every moment spent in footing bills will be a sheer waste of clerical time.

This machine does *your* work *your* way.

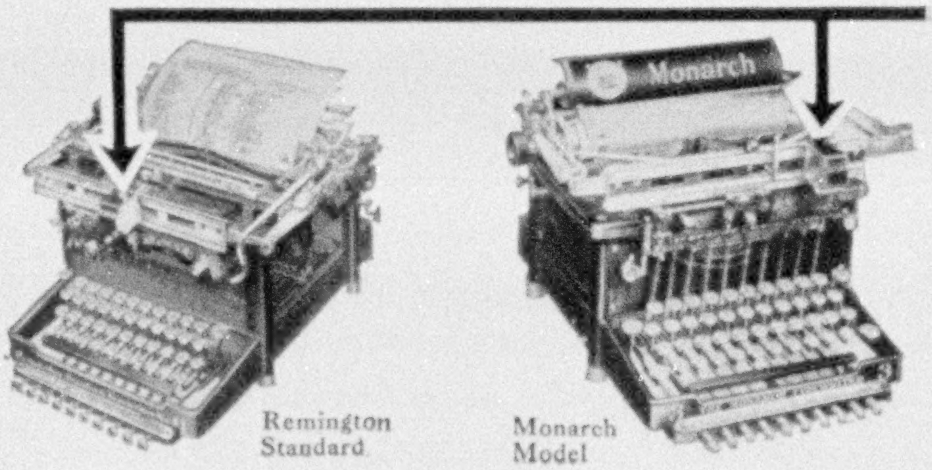
You can start using it tomorrow—without altering your accounting system in the slightest.

The only change it forces is a change from human inaccuracy to mechanical precision—from time-waste to time-saving.

* * * *

The Remington Adding and Subtracting Typewriter is

(1)—always ready as a complete, easy-running typewriter for letter-writing.



Remington Standard

Monarch Model

Remington Typewriter Company, Incorporated,

For clear, clean, typewriter results, use Remtico brand letter

(2)—always ready as a quick adder and subtracter, for listing.

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This latest and most remarkable Remington time-saver is now used constantly in thousands of retail stores, banks, and business offices—large and small.

The United States Sub-Treasury and the New York City Finance Department use it continuously.

Machines installed five years ago have paid for themselves over and over again in time saved—*to say nothing of errors caught before they were made.*

* * * *

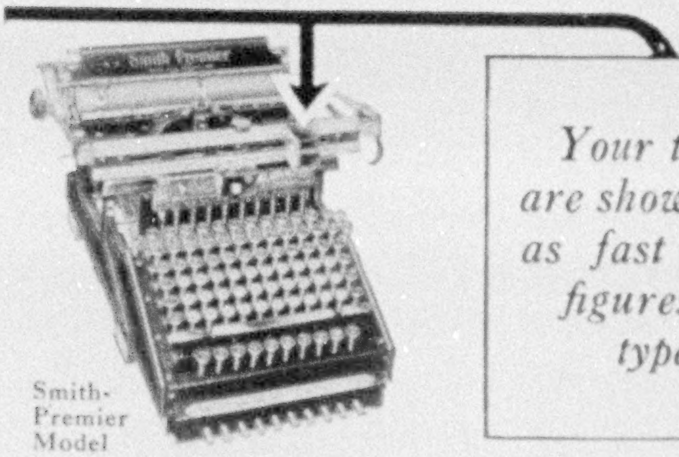
The Remington Adding and Subtracting Typewriter puts the old methods of footing bills and statements into a past business age.

A booklet "The New Remington Idea," gives more details. Write for it today. It is much easier to *keep up* with the times than to *catch up*.

REMINGTON
Adding and Subtracting
TYPEWRITER

(WAHL MECHANISM)

The Remington Adding and Subtracting Typewriter can be had in any of the Remington Models shown below. Each is a member of the famous Remington family.



Smith-Premier Model

Your totals are shown here as fast as the figures are typed

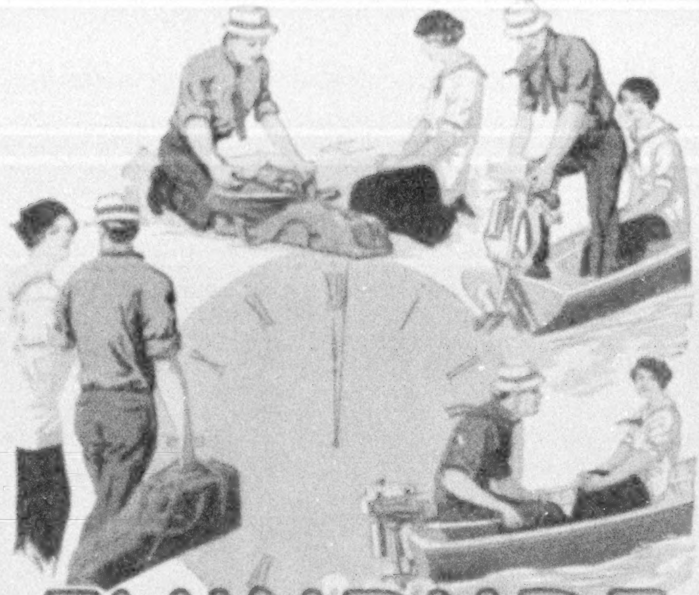
Each is a complete, easy-running typewriter, plus the adding and subtracting feature.

Each is designed and built so as to insure maximum durability.

Each has distinctive features designed to meet individual requirements.

New York City (*Branches Everywhere*)

paper, carbon paper, and ribbons. Write to our nearest office.



EVINRUDE

Make a Motor-Boat of Any Rowboat in Less Than One Minute

Turn any rowboat into a motor-boat with an

TRADE MARK EVINRUDE DETACHABLE ROW BOAT MOTOR

Starts with one-twelfth turn of fly-wheel; no cranking.

Drives a rowboat 8 miles an hour—a canoe 12 miles.

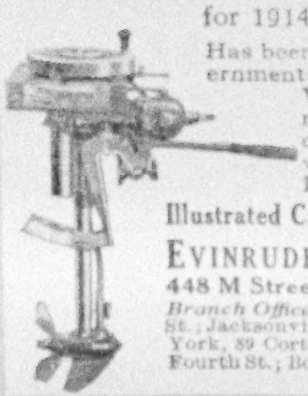
So simple to operate that women and children are "Evinruding" everywhere. Why not get one for *your* vacation? By special arrangement we have procured as an exclusive feature, the

Famous Maxim Silencer

and can apply it to either 1913 or 1914 models. The "Evinrude" has always been practically silent in operation, but this addition makes it a veritable triumph. No similar motor can use the Maxim Silencer. It has been added to the already long list of exclusive "Evinrude" features. It is the only marine motor in the world having a

Built-in Reversible Magneto

This magneto is not affected by rain, waves or even complete submersion. The "Evinrude" is built by the largest manufacturers of rowboat motors in the world. Capacity for 1914, 60,000 "Evinrudes".



Has been adopted by twelve governments, including the U. S. A. Weight about 50 pounds, may be carried like a suit case. For sale at Hardware and Sporting Goods Dealers everywhere.

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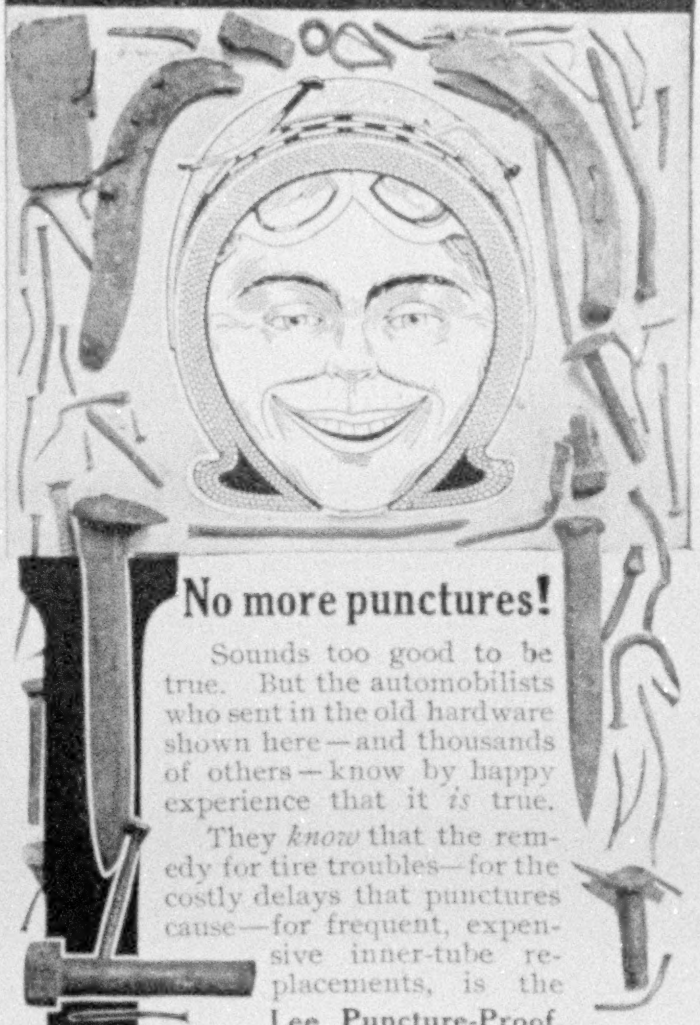
448 M Street Milwaukee, Wis.

Branch Offices—San Francisco, 423 Market St.; Jacksonville, Fla., Foot of Main St.; New York, 89 Cortlandt St.; Portland, Ore., 106 Fourth St.; Boston, 218 State St.

Lee PUNCTURE-PROOF OR MONEY BACK Pneumatic Tires



No more punctures!

Sounds too good to be true. But the automobilists who sent in the old hardware shown here—and thousands of others—know by happy experience that it *is* true.

They *know* that the remedy for tire troubles—for the costly delays that punctures cause—for frequent, expensive inner-tube replacements, is the **Lee Puncture-Proof,** *the extra-service pneumatic tire.* Their reports should convince any skeptic.

Free Pamphlet V, "Real Relief for Auto Owners," contains many letters on the service given by "*the tires that put the sure in pleasure.*"

Why gamble with punctures—losing time, patience, and money—when with every **Lee Puncture-Proof Pneumatic Tire** we give a

Money-Back Guarantee

which assures you freedom from punctures or the return of every extra cent you paid for insurance against them. You can't lose—you have everything to gain. Write today for this Pamphlet V, giving full data on *the experience of users; the exact wording of that guarantee; the details of construction* (with 3200 or more discs of armor-steel, imbedded in rubber, overlapping with heavy fabric between—making friction and heating impossible); *the live, extra-dense, doubly-tough*

"Vanadium" Rubber

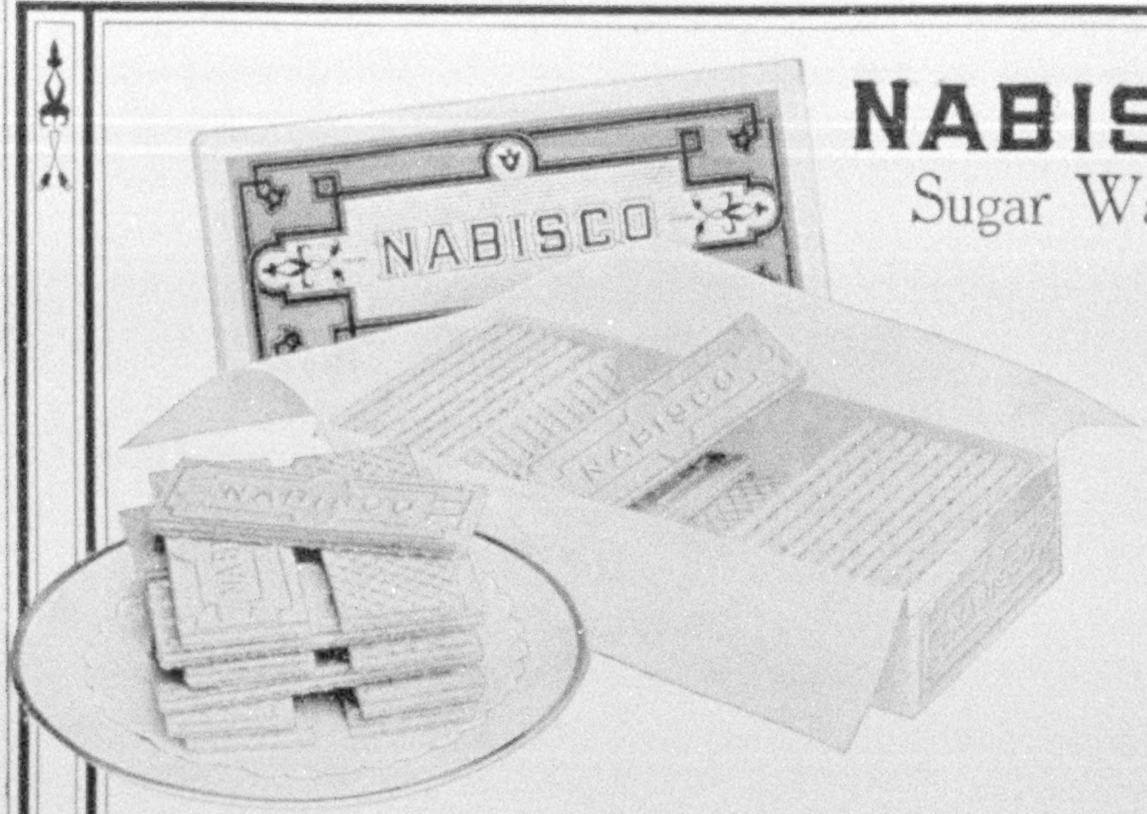
(used *only* in the Lee factory), which assures longer life, greater resiliency, and comparative freedom from oil-rotting.

LEE TIRE & RUBBER COMPANY
Conshohocken, Pa.

"Smile at Miles"

NABISCO

Sugar Wafers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NABISCO

THESE incomparable sweets are the most universally popular of all dessert confections. Whether served at dinner, afternoon tea or any social gathering, Nabisco Sugar Wafers are equally delightful and appropriate. In ten-cent tins; also in twenty-five-cent tins.

ADORA

Another dessert delight. Wafers of pleasing size and form with a bountiful confectionery filling. Another help to the hostess. In ten-cent tins.

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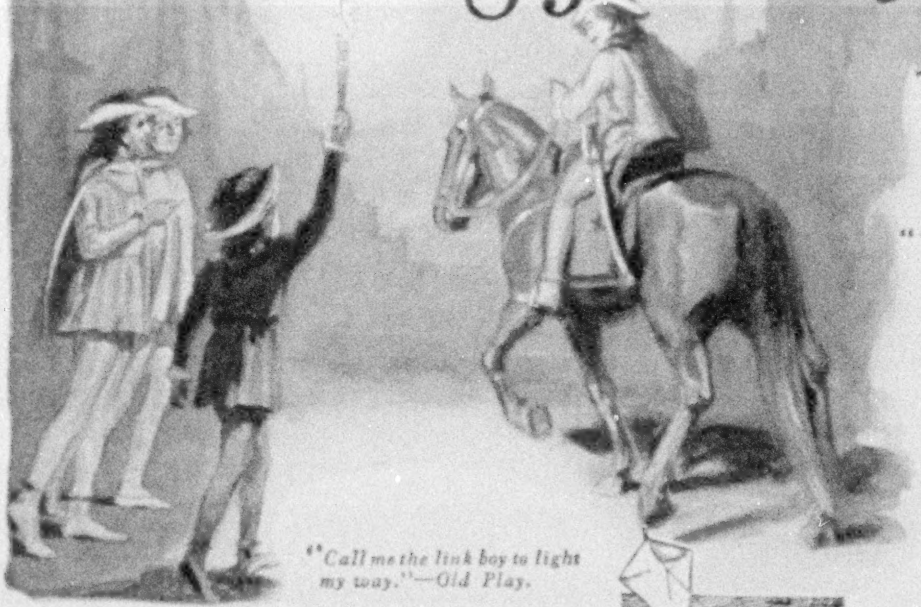
ADORA
A FILLED SUGAR WAFER CONFECTION

The Long Journey of Science



"Call me the link boy to light my way."—Old Play.

Talks About MAZDA—No. 3

"Not the name of a thing but the mark of a Service"

TURN the button—flash! Many lifetimes' study of electricity is summed up for you in that quick and splendid radiance.

Your forefathers had more trouble in getting the light of a single, dim candle. Yet we take this modern miracle for granted—this cheerful light summoned by the fingers, that is so many times more helpful, so many times cheaper per candle power than the cheapest candles.

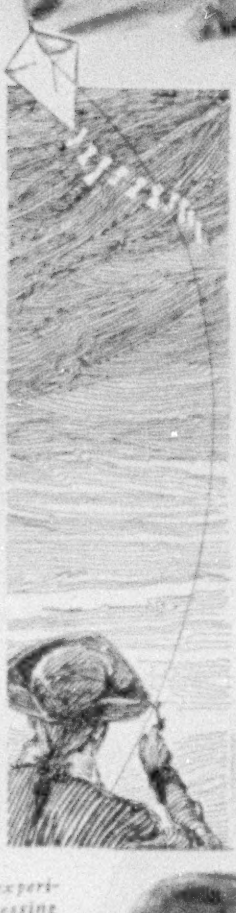
Think of the ancient men conjuring the flame from the sapling, the pine knot, the grease from animal bodies, the oil of the earth. Think of the world's long struggle for more light and cheaper light, unguided in earlier days by an adequate knowledge or by any systematic method of reaching the goal that was sought.

Think of the joy of the Dutch burgomaster von Guericke, more than two centuries ago, when he proved to scientists of his time that electricity had the power to give forth light. Think of these isolated experimenters turning cranks to produce light-flashes by friction, and of their endless groping to capture that light.

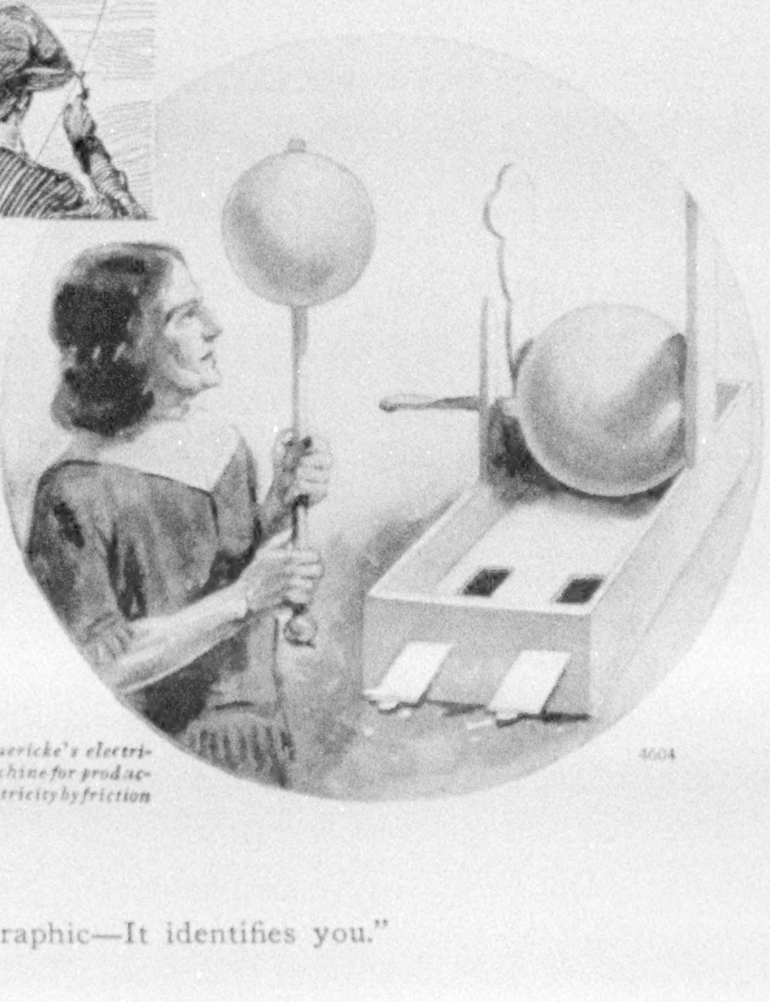
Think of Franklin (one hundred and sixty years ago this past summer) flushed with excitement on discovering that the electricity of the sky could be conducted by a kite string.

Think of the tremendous obstacles overcome in the production of Edison's first carbon incandescent light. Electrical science was now to settle itself to the systematic study of this vast problem which in earlier days had been left to slow, blind, accidental advance. And manufacture had begun to feel the impetus of help communicated by organized research, experiment and selection.

Think of that next big step—this time the use of filaments of *metal*, such as tantalum and tungsten.



Franklin's early experiment in harnessing electricity.



Von Guericke's electrical machine for producing electricity by friction

in Search of Perfect Light

But obstacles were still to be overcome. For example, the tungsten paste filament was fragile. The first MAZDA lamp gave more light and cheaper light, yet left something still to be added—greater sturdiness fully to meet the strain of everyday usage.

Then the triumph of the *drawn wire* filament in the MAZDA lamp of today—*three times as much light* as the old style carbon lamps, with the same amount of electric current, and rugged enough in elements and construction to round out the full wonder of its practical efficiency.

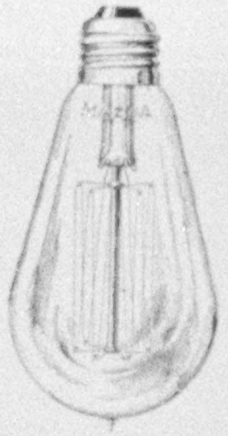
The plodding scientists had climbed a step higher in the great world-journey between the humble candle and the ideal light.

Will they stop here?

Will that group of scientists in the Research Laboratories of the General Electric Company at Schenectady be satisfied with these selected methods of construction revealed by the lamp marked MAZDA?

The mark MAZDA itself answers that question.

MAZDA is the mark of a Service and it designates the great plan by which the MAZDA lamp *shall continue to mean* the highest achievement in incandescent lighting.



The MAZDA Lamp of today which gives three times as much light as carbon lamps. It embodies the results of MAZDA Service to the manufacturers.

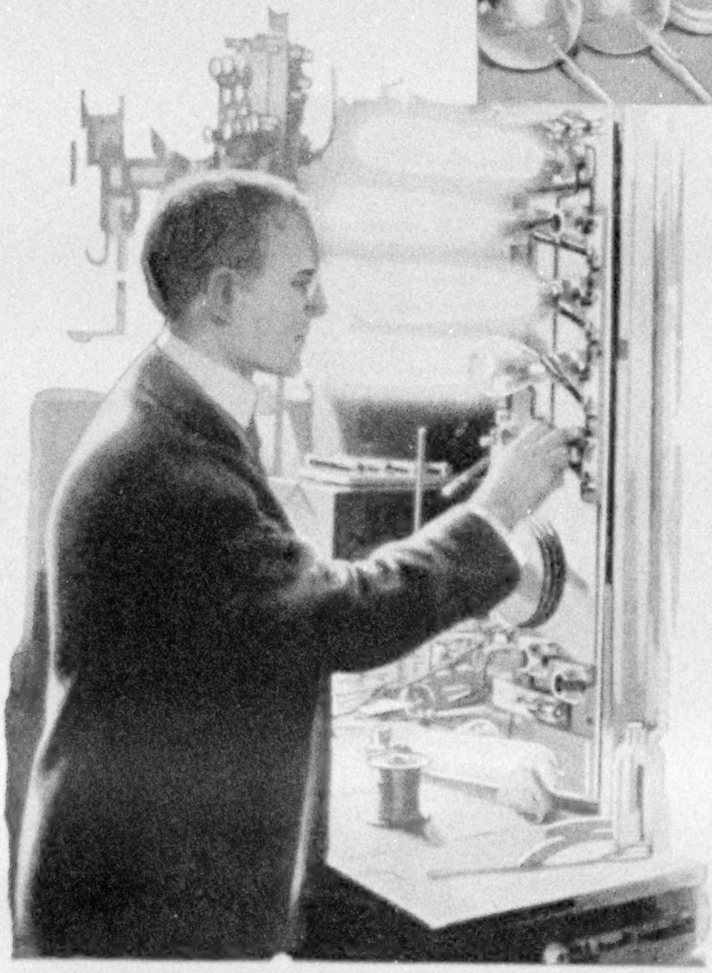
MAZDA Service means that the Research Laboratories are not only assembling the results of their own incessant and exhaustive investigations, and those of their associates in the active developing and manufacturing centers at Cleveland and Harrison, but are keeping in close touch with great experimental lamp laboratories in Europe.

Even the shape of glass bulbs is a subject for constant experimentation.

MAZDA Service means also the furnishing to the General Electric Company factories, and to the factories of other Companies entitled to receive this Service, every new fragment of knowledge, from whatever source derived, which shall be selected in the course of this service to the manufacturers for embodiment in the MAZDA lamp.

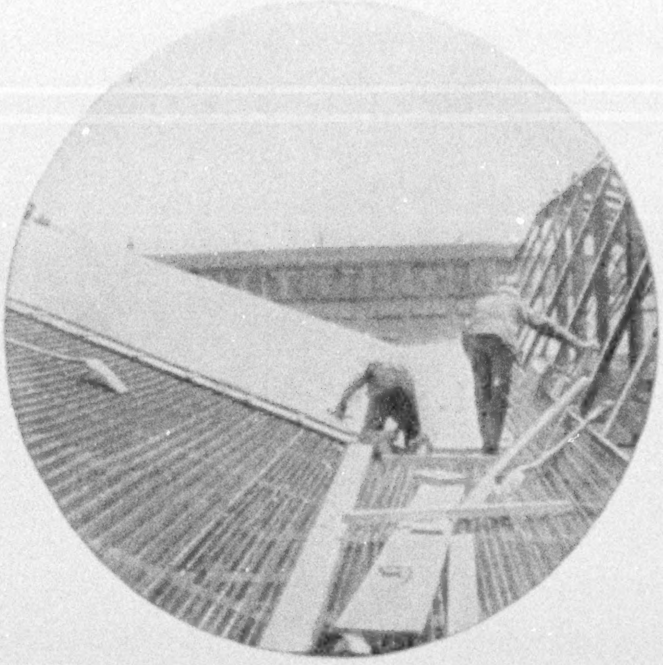
In other words, the mark MAZDA on a lamp means that this world-wide MAZDA Service has been received by the makers of that lamp.

This is your assurance when you buy a MAZDA lamp — whether you buy it today, tomorrow, next month or at any future time — that you have the incandescent electric lamp that sums up the latest efforts of the broadest lamp service in the world.



In one of the testing rooms of the Research Laboratories. MAZDA Service involves unceasing tests and experiments with the aim that MAZDA shall always mean the furthest advance in metal filament lighting.

GENERAL ELECTRIC COMPANY



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Build Better, Quicker, at Less Expense

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It makes possible a roof of concrete but two inches thick—a roof of any shape, fire-proof, light, but as strong and enduring as one made in the old way twice as thick.

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we will supply you with full information regarding this economical method of concrete construction.

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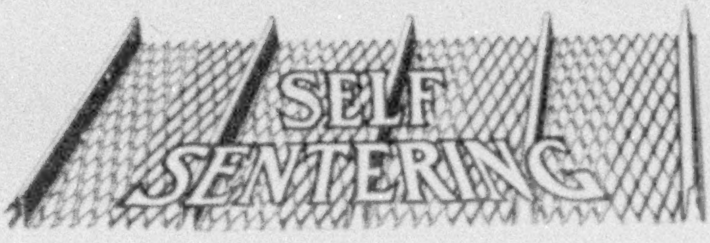

(Pat. Mar. 3, 1914. Other patents pending)

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Single-room houses for Wrens, Bluebirds, Swallows, Chickadees, Flickers, Tufted Tits, etc., $1.00 each. One dozen assorted, $10.00. Small lots by parcel post, postage extra.

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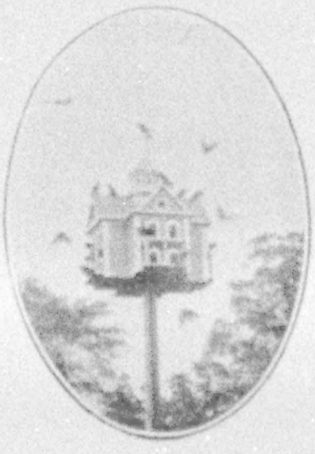

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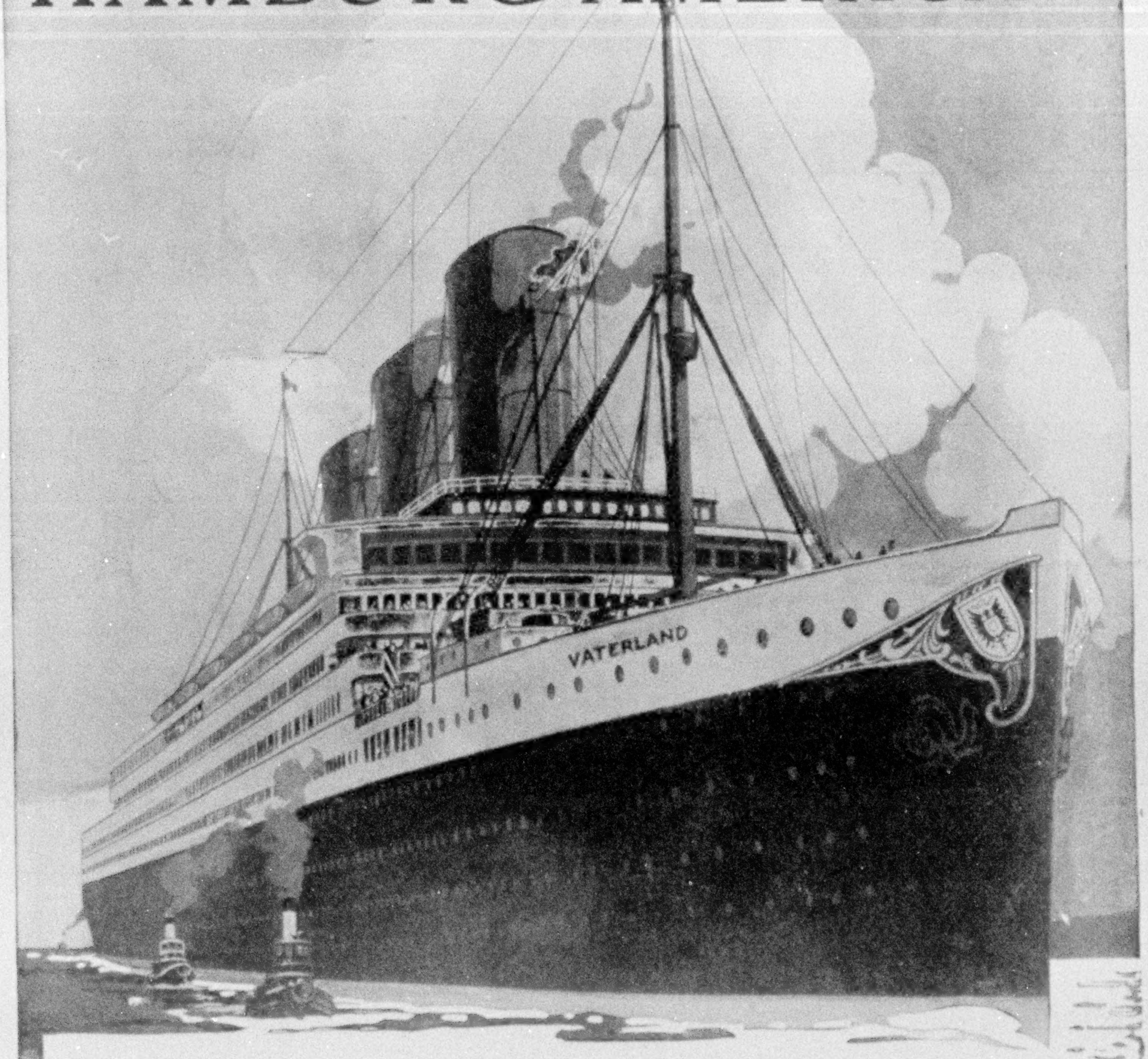

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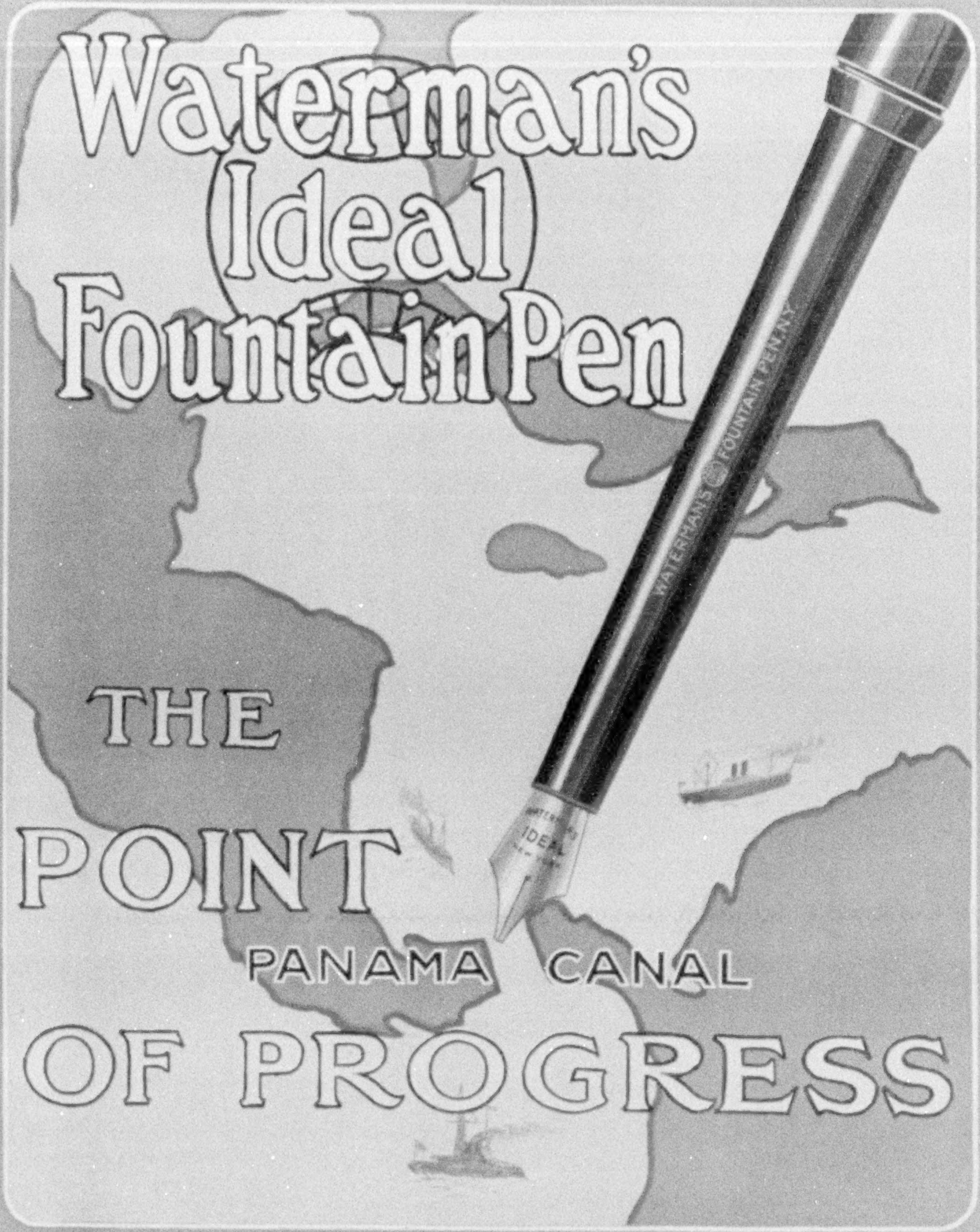
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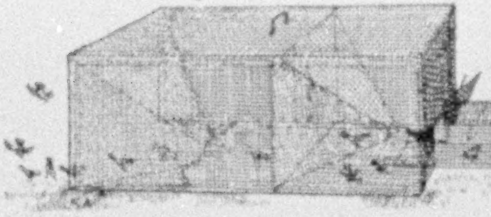

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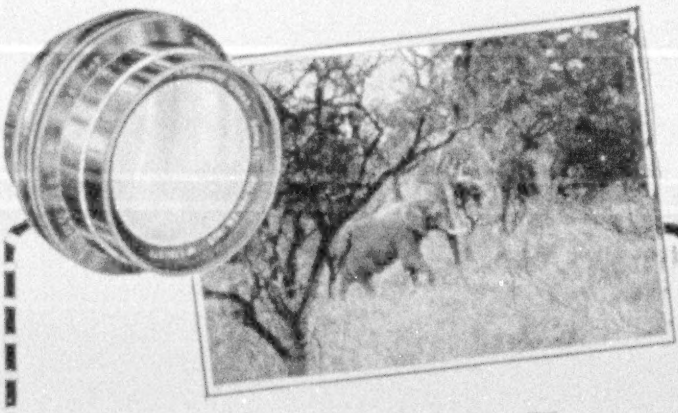

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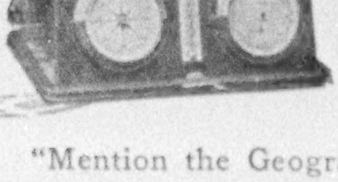

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On the down thrust or compression—The Ames disengages and in no way confines or restricts the flexibility of the motor-car spring except when required by the recoil or throw above normal.

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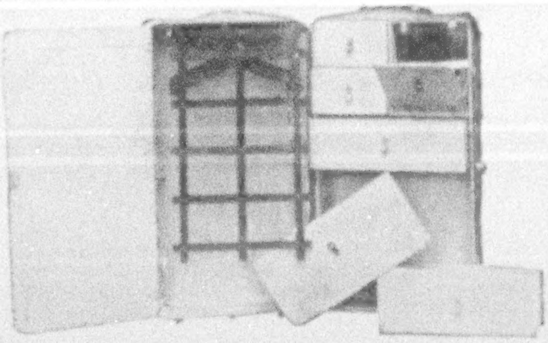

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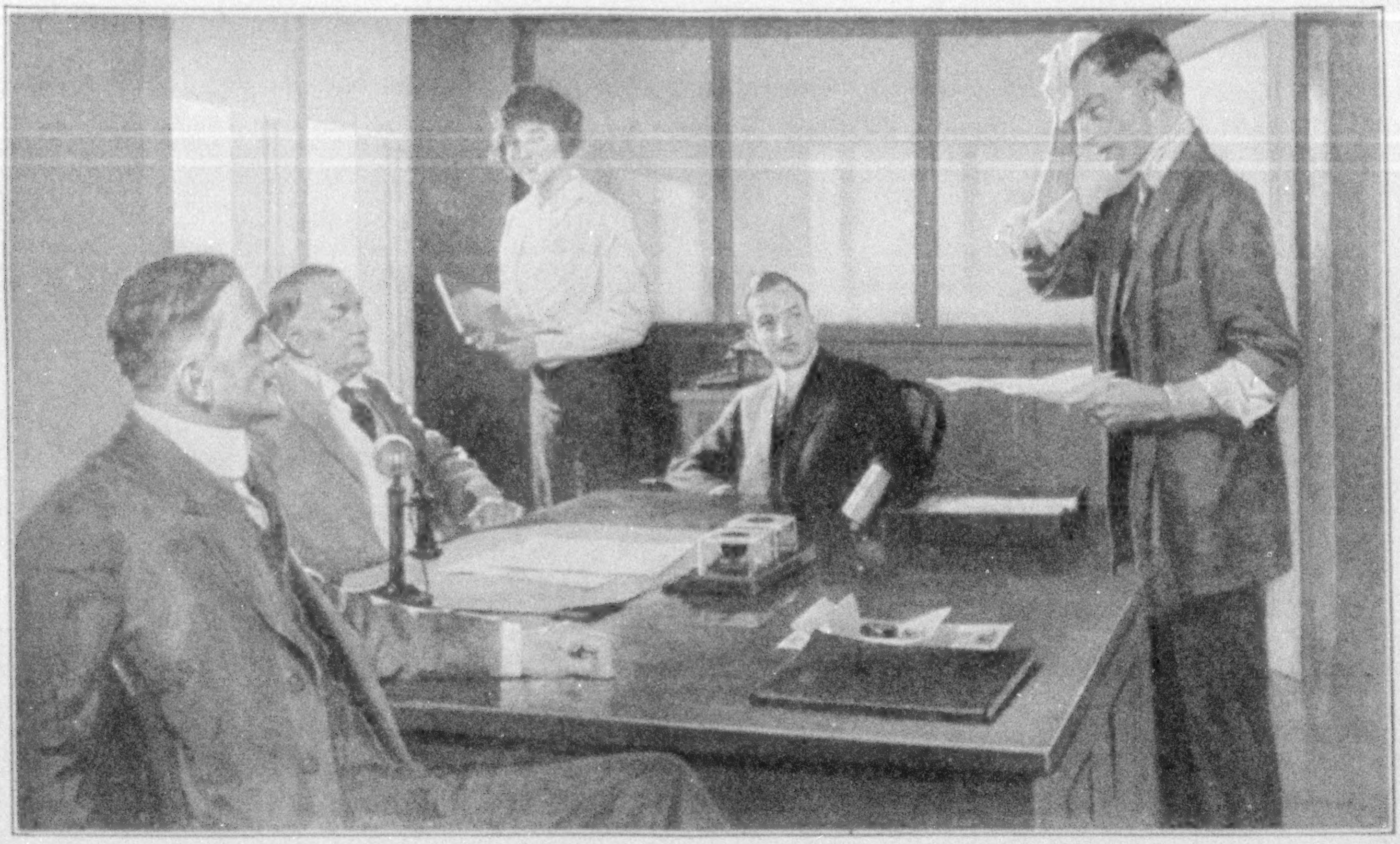

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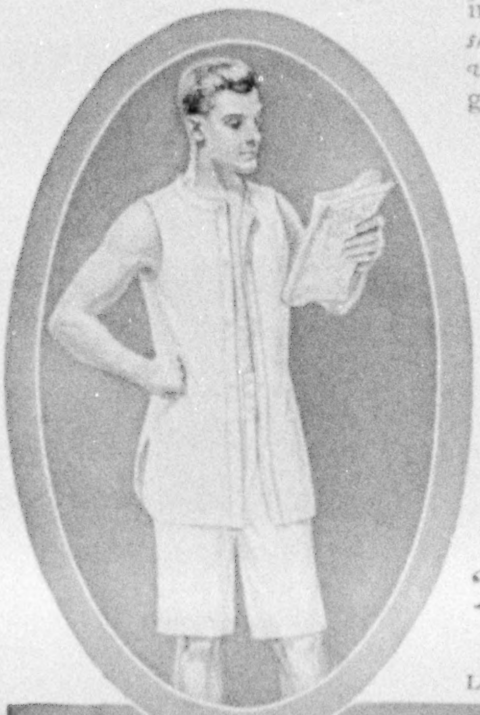
A TYPICAL summer day—a typical office scene—a round of smiles at the mingled *discomfort* and *discomfiture* of the man who hasn't found out that B.V.D. is "*the first aid*" to coolness. *You*, of course, have B.V.D. on or ready to put on. If not, march to the nearest store and *get it*.



For your own welfare, fix this label firmly in your mind and make the salesman *show* it to you. If he can't or won't, *walk out!* On every B.V.D. Undergarment is sewed

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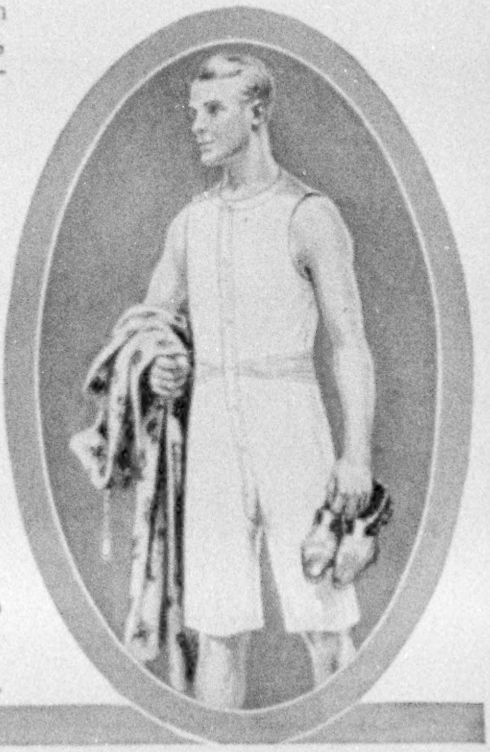

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Look for the "Necco Seal" on every package, at all the best confectioners'.

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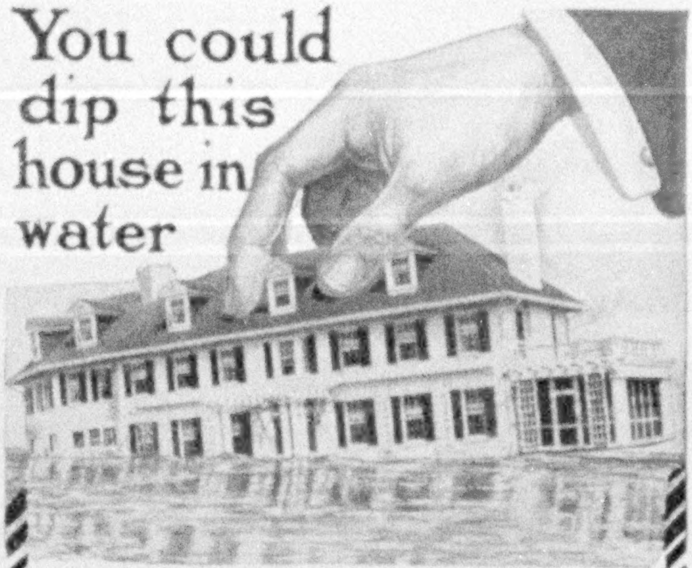

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Enjoy those distant details which are so inviting and so interesting—see *everything* through

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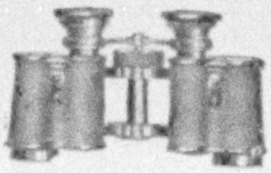

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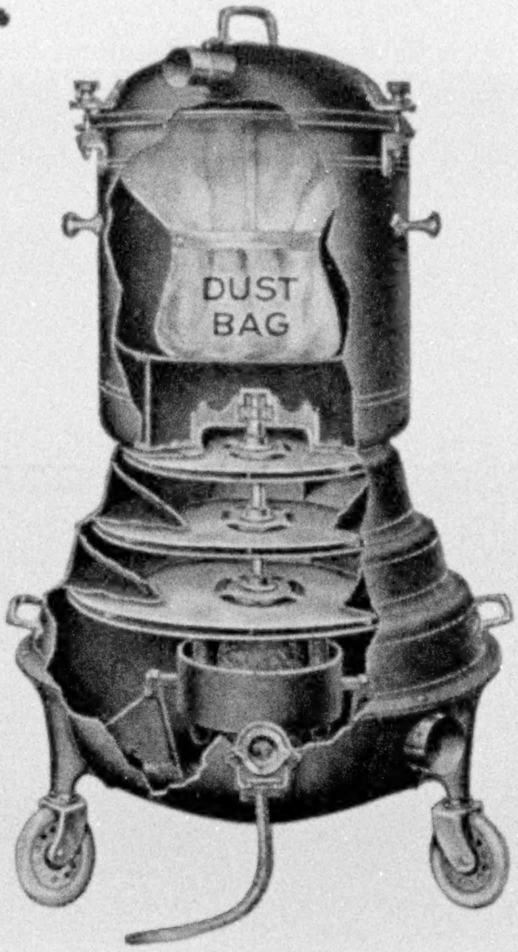
Consider the INSIDE of a Vacuum Cleaner



A VACUUM cleaner is a machine. You must judge it as a machine—from a mechanical view-point. To do this you must consider the inside—the *works.* You must get below the case that encloses the mechanism to see what you are buying.

The fact is, you want service—efficiency—cleaning power—and the things that accomplish these are the *only* things to think of. You do not have to be a mechanic, an electrician or an engineer. You have to apply only common sense to discover why many types of vacuum cleaners are so short lived and so inefficient—and why the

Vacuna
VACUUM CLEANER

has established such a wonderful record for cleaning power and for never-wear-out durability.

Cleaning by vacuum or air suction is the one thorough, sanitary and healthful method. The first application of this idea brought out many types of machines which were complicated, which had many moving parts—machines which were fundamentally wrong in principle. Many lasted only a few months. It is not surprising that the owners thought vacuum cleaning only a dream These premature types had to be abandoned as worthless.

A Marvel of Simplicity

The person who has already owned one of these inefficient vacuum cleaners instantly appreciates the mechanical simplicity and remarkable cleaning achievements of the Vacuna. The Vacuna has only one revolving unit—a shaft on which are mounted three turbine fans suspended at either end on frictionless ball bearings. This single piece of machinery is *all there is* to the vacuum creating plant of the Vacuna. No bellows, no diaphragms, nothing to wear out, nothing to get out of order or even need attention—one or two lubrications a year is the only attention the Vacuna requires.

In no other machine is the suction created as it is in the Vacuna. The revolving fans are so constructed that there is a constant, uniform intake of air strong enough to make the Vacuna a revelation in thorough cleaning yet absolutely harmless to the most delicate rug or fabric.

The Vacuna Challenges Comparison

with any other cleaning system, portable or stationary, for efficiency, simplicity and durability. No Vacuna has ever yet worn out. None has ever been returned for repairs. You simply cannot compare the Vacuna with any other vacuum cleaner. They have nothing in common.

To substantiate our statements we can refer you to residences, apartment houses, hotels, public buildings, etc., where there are already expensive stationary vacuum cleaning plants or where other portable machines are owned, but where the Vacuna is purchased and used in preference to all others.

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Let us put you in touch with our nearest dealer to demonstrate
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"Vacuna" offers a wonderful opportunity for the right dealer

May Planting Suggestions

WE have an exceptionally fine collection of full budded Rhododendrons in all the desirable hardy kinds.

Boxwood, Privet, Lilacs, Evergreens, and even Linden Trees, as well as Rhododendrons, you know, can be successfully planted in May.

In all these things we have splendidly grown stock of the high quality that it pays best to buy.

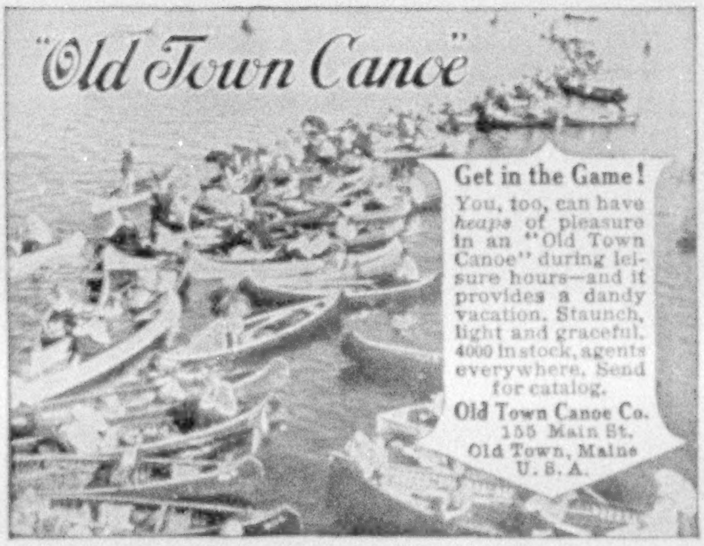
In Evergreens we have all sizes from 5 inches to 30 feet. Good, healthy, strong-rooted trees, every one of them.

Big trees for immediate effects, we are strong on. To the moving of big trees we give special attention.

Send for booklet and catalogue.

Hicks Trees

Isaac Hicks & Son
Westbury, Long Island



Get in the Game!

You, too, can have *heaps* of pleasure in an "Old Town Canoe" during leisure hours—and it provides a dandy vacation. Staunch, light and graceful. 4000 in stock, agents everywhere. Send for catalog.

Old Town Canoe Co.
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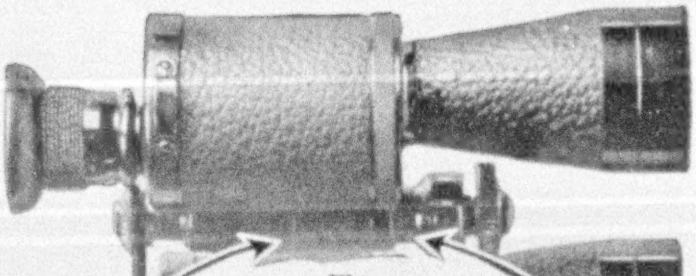
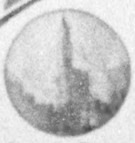


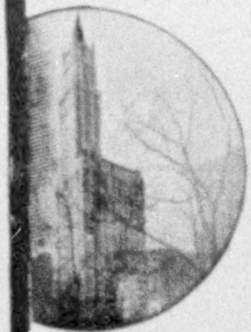
This
Masterpiece of
Optical Mechanism

will prove a revelation to you. Look at the illustrations and you will get some idea of what it will do.



Woolworth Bldg. as seen by the eye at 1 1-2 miles.

Same building through field glass.



As seen through Perplex Binocular.

PERPLEX
Prism Binoculars

are invaluable to traveler, camper, yachtsman, or any one who wants "to see things." They are as far beyond the ordinary field glass as the latter is beyond human eyesight.

F. M. Taylor, Postmaster, Titusville, Fla., says: "I use a Binocular daily to pick up the mail boat, which I can do perfectly at 6 1-2 miles though the boat is only 75 feet long."

Think of the pleasure and use one would afford *you*.

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Scene near Boston, Mass. Gypsy Moths stripped trees at right. Tree Tanglefoot protected those at left.

Millions of Trees Are Likewise Saved Each Year With TREE TANGLEFOOT

Will not injure trees. Easily applied with wooden paddle. One pound makes about 10 lineal feet of band. One application remains sticky 3 months and longer—outlasting 10 to 20 times any other substance. Works alike, rain or shine. Won't soften—won't run or melt, yet always elastic, expanding with growth of tree. No mixing—simply open can and use.

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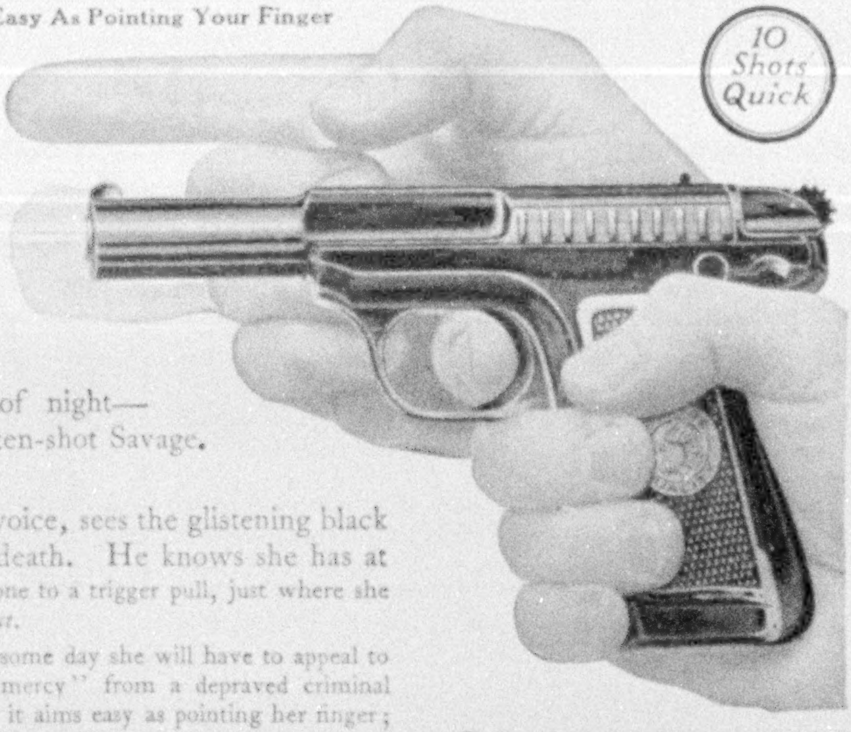

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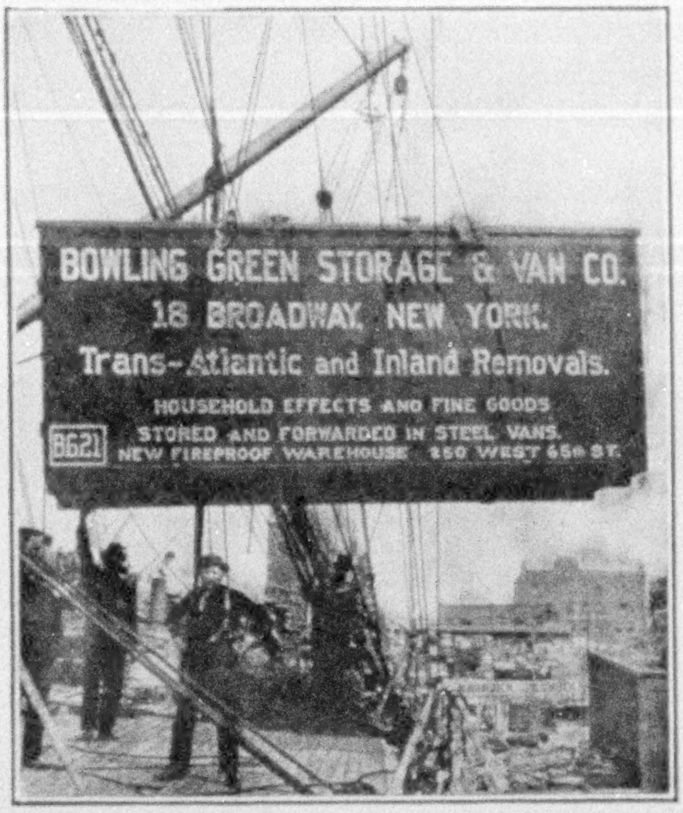
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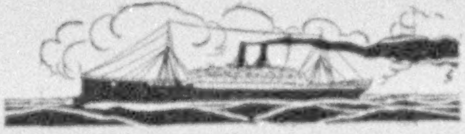

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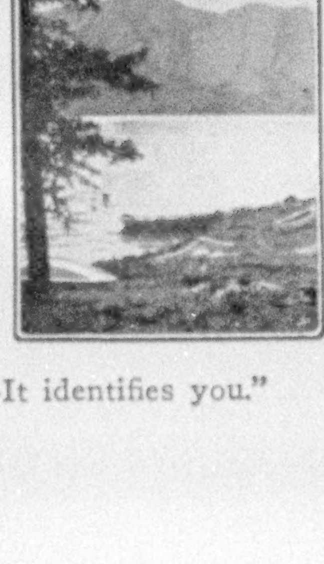

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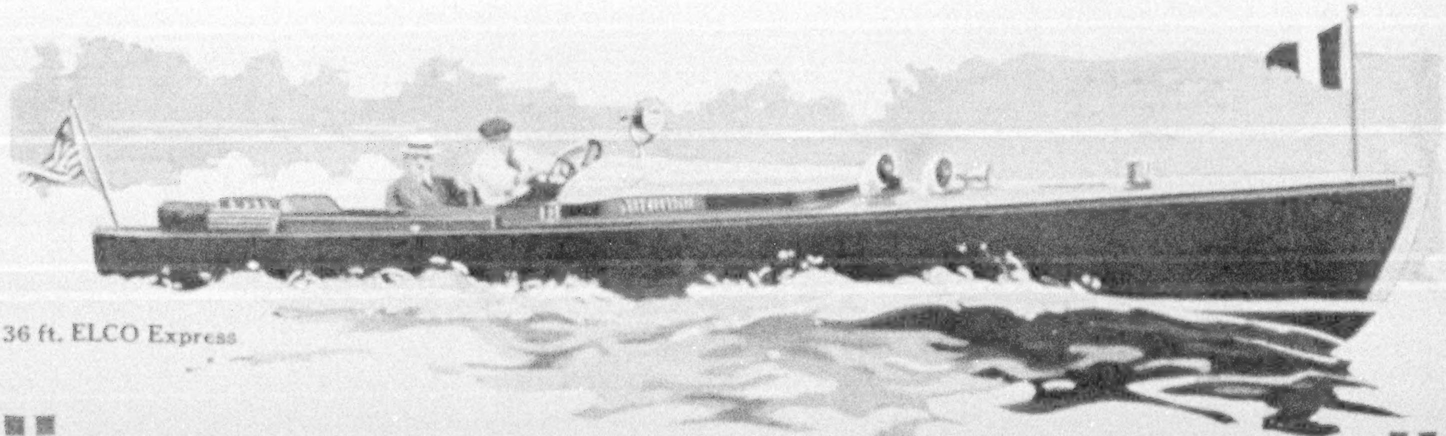

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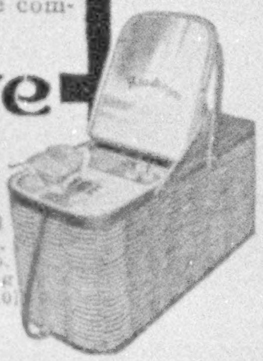

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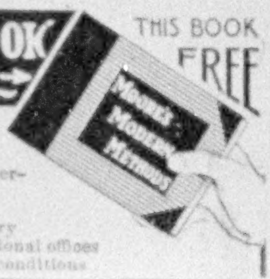

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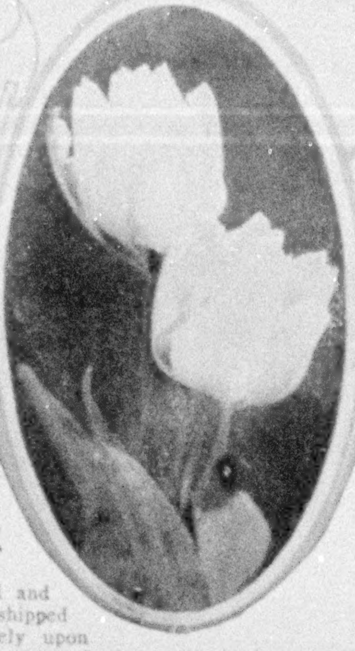

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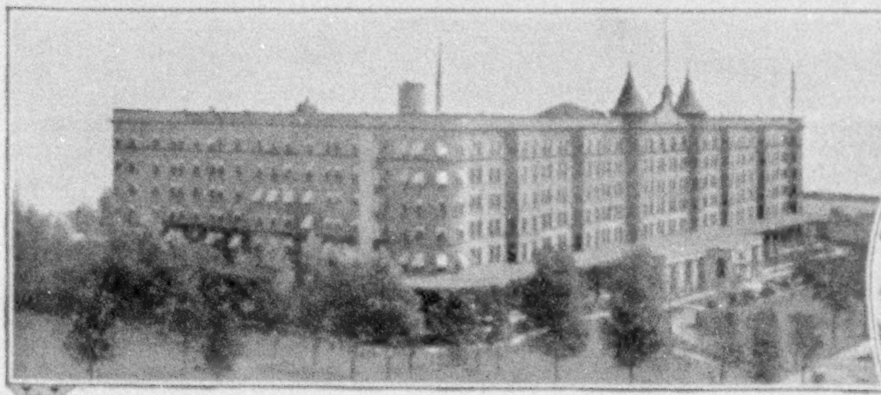

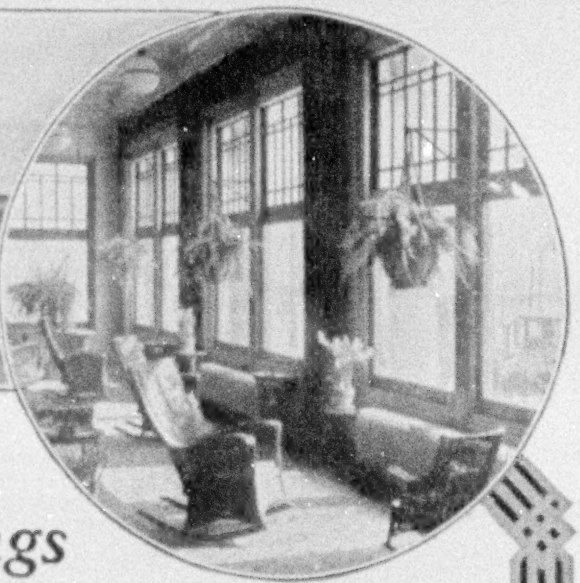

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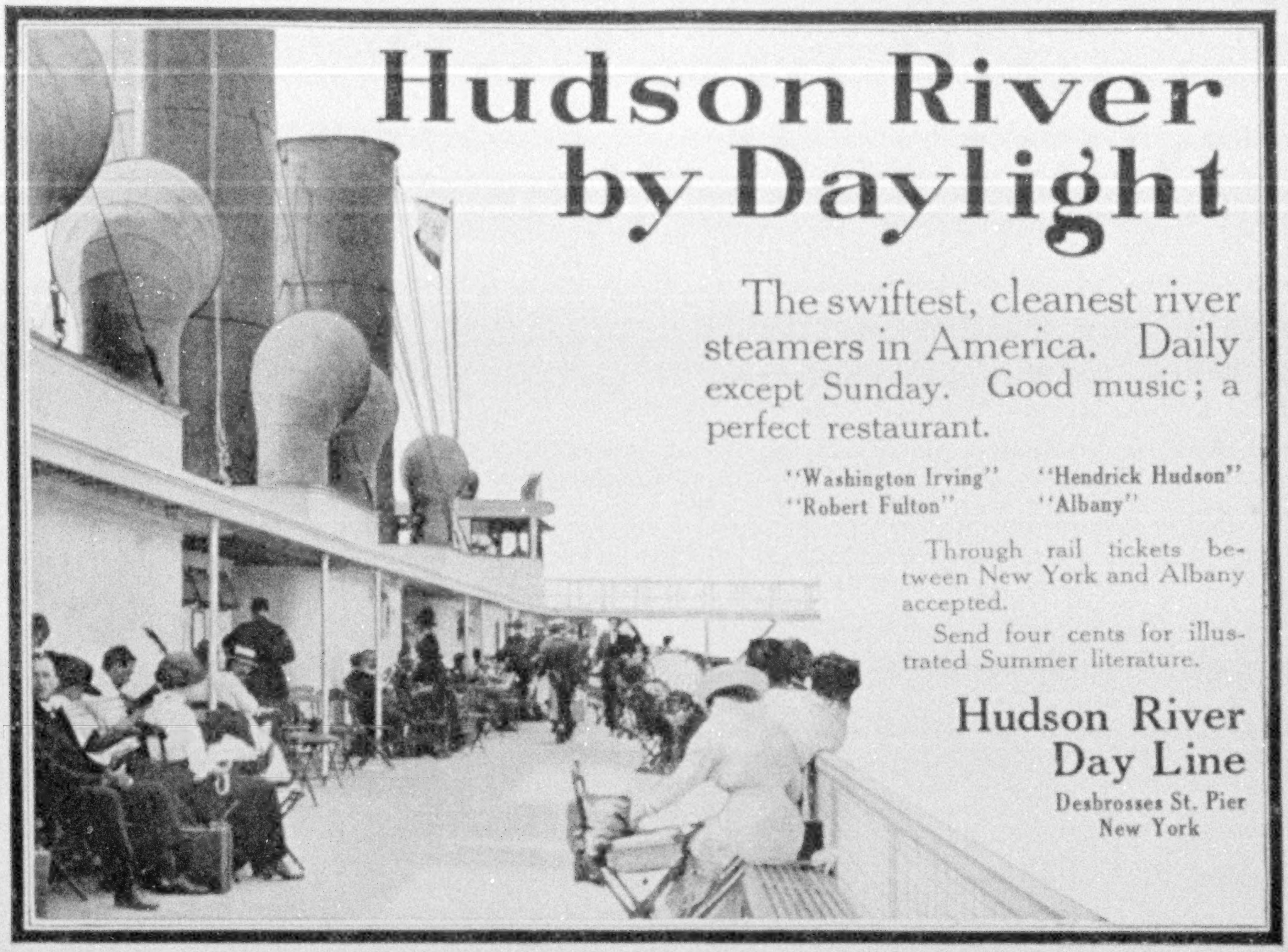

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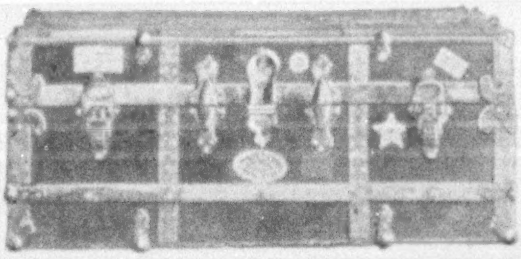

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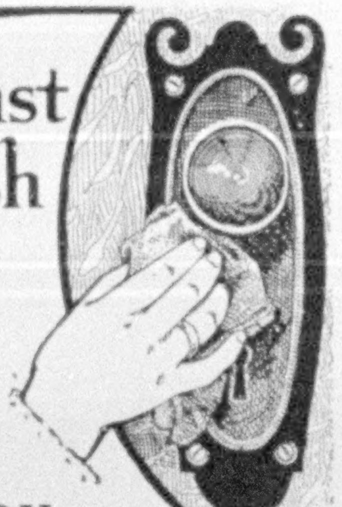

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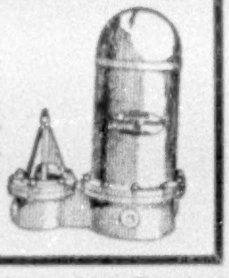

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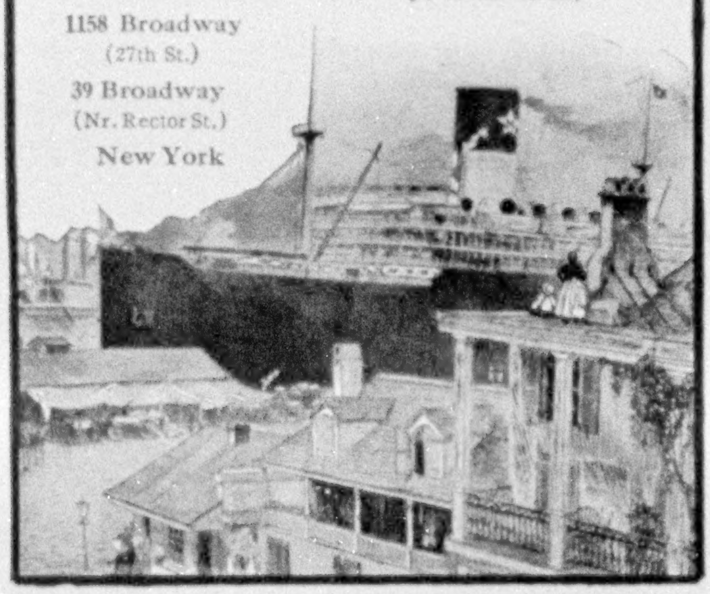

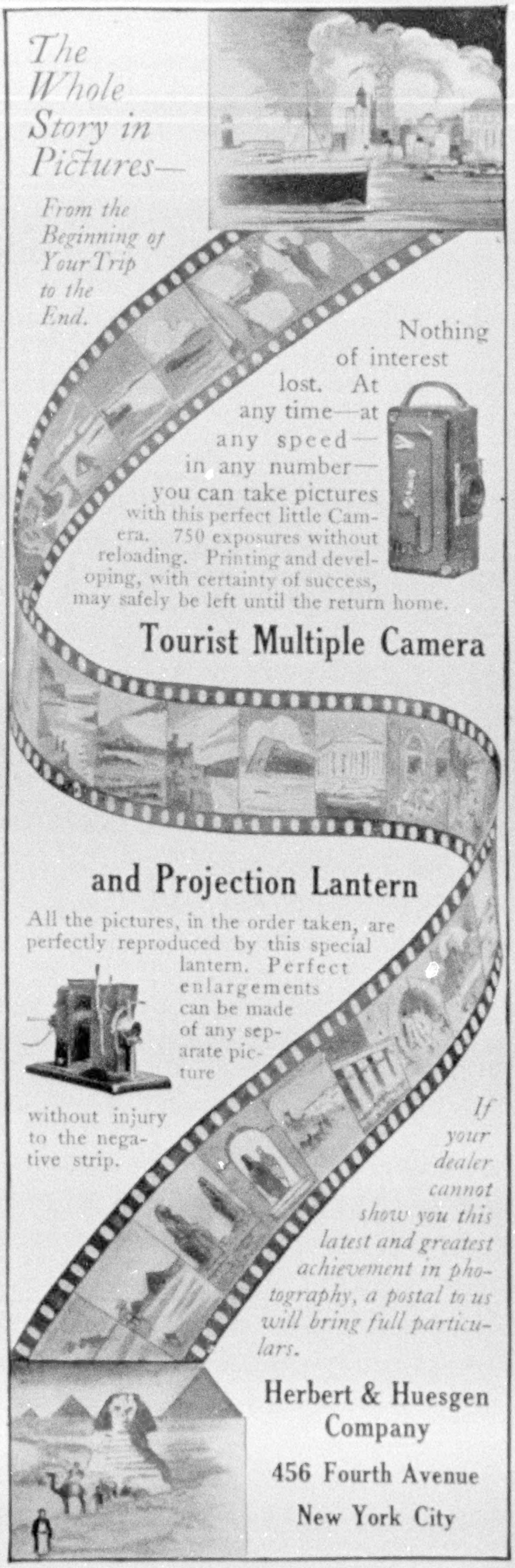

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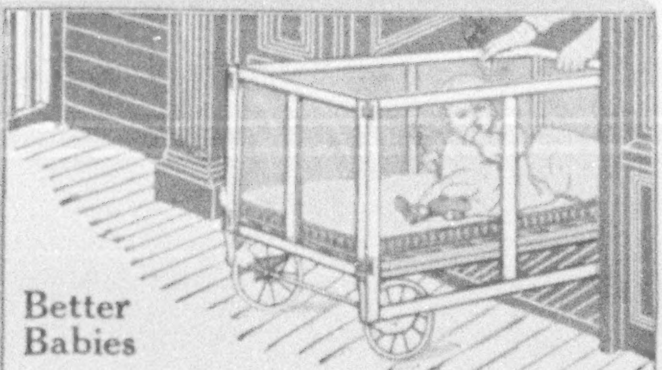

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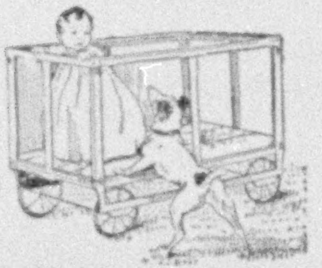

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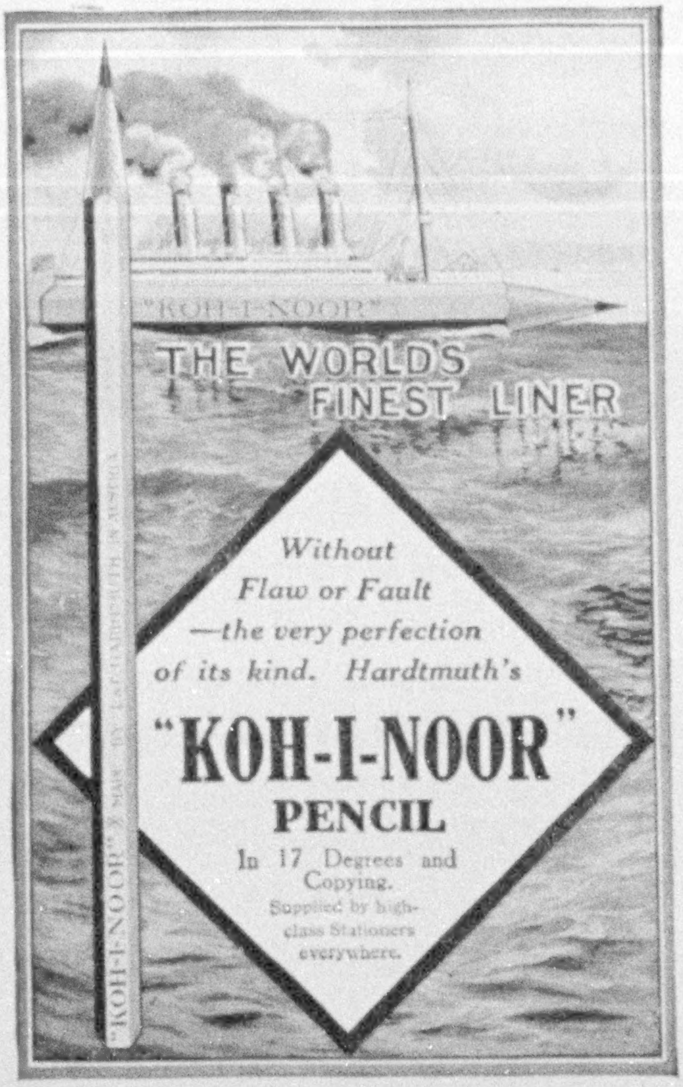

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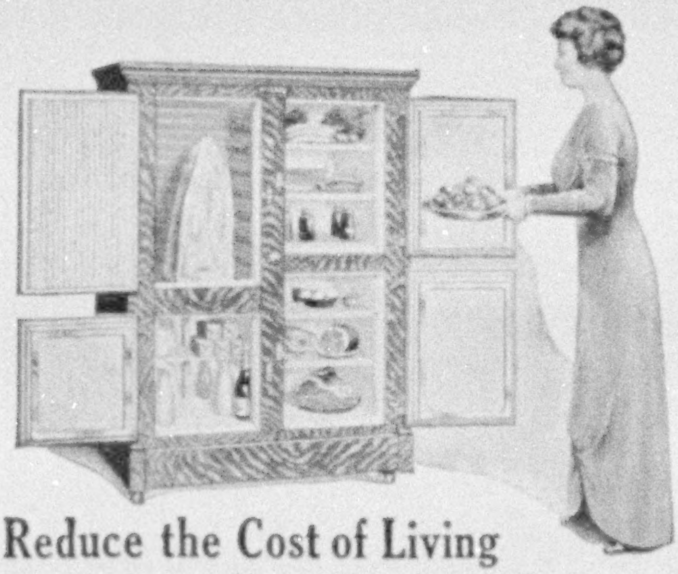

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Fits any boat. Ball-bearing Engine. 10½-inch Weedless Propeller. 3-ring Piston, same as in Packard car. Copper Water Jacket, same as in Cadillac car. Kingston Carburetor, same as in highest grade auto and marine engines. Silent Under-water Exhaust, same as in highest-priced launches. Steers from any part of the boat. Perfect control from trolling to racing. Sends 18-foot boat 8 to 9 miles per hour. Uses gasoline and oil mixed. No vibrations. No noise. Runs and keeps on running day after day. Guaranteed for life. Money back without argument if not satisfied. Write for free catalog and special 30-day price.

SWEET MFG. CO., 95 Griswold St., Detroit, Mich.

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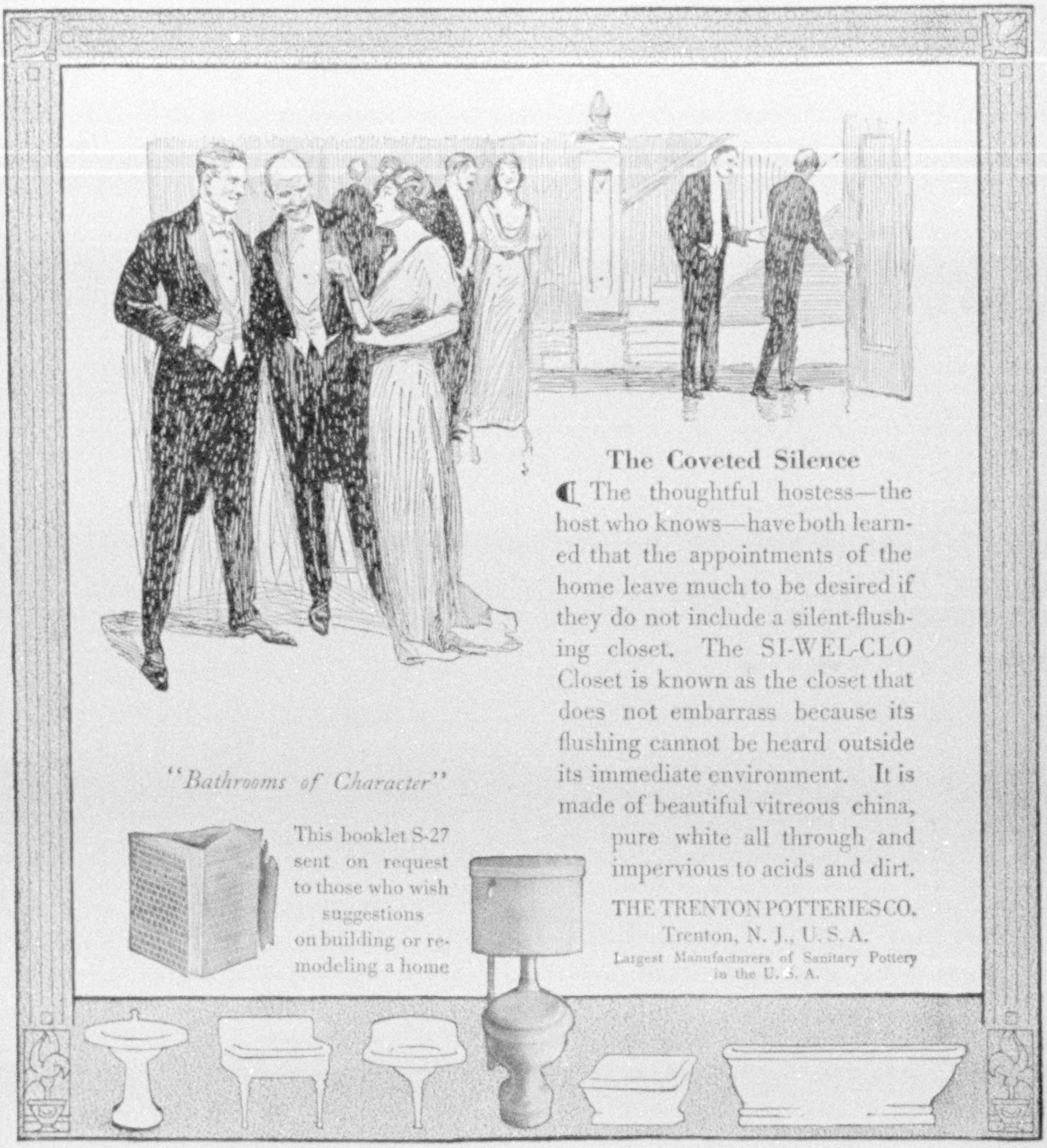


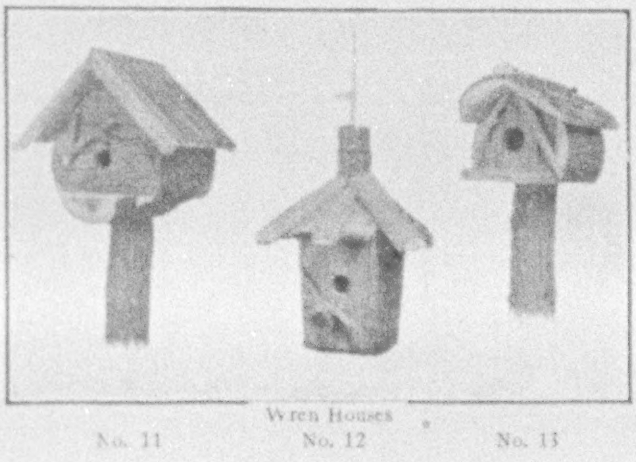
The Coveted Silence

The thoughtful hostess—the host who knows—have both learned that the appointments of the home leave much to be desired if they do not include a silent-flushing closet. The SI-WEL-CLO Closet is known as the closet that does not embarrass because its flushing cannot be heard outside its immediate environment. It is made of beautiful vitreous china, pure white all through and impervious to acids and dirt.

THE TRENTON POTTERIES CO.
Trenton, N. J., U. S. A.
Largest Manufacturers of Sanitary Pottery in the U. S. A.

"Bathrooms of Character"

This booklet S-27 sent on request to those who wish suggestions on building or remodeling a home



Wren Houses

No. 11 No. 12 No. 13

"Back to Nature Movement Among the Birds"

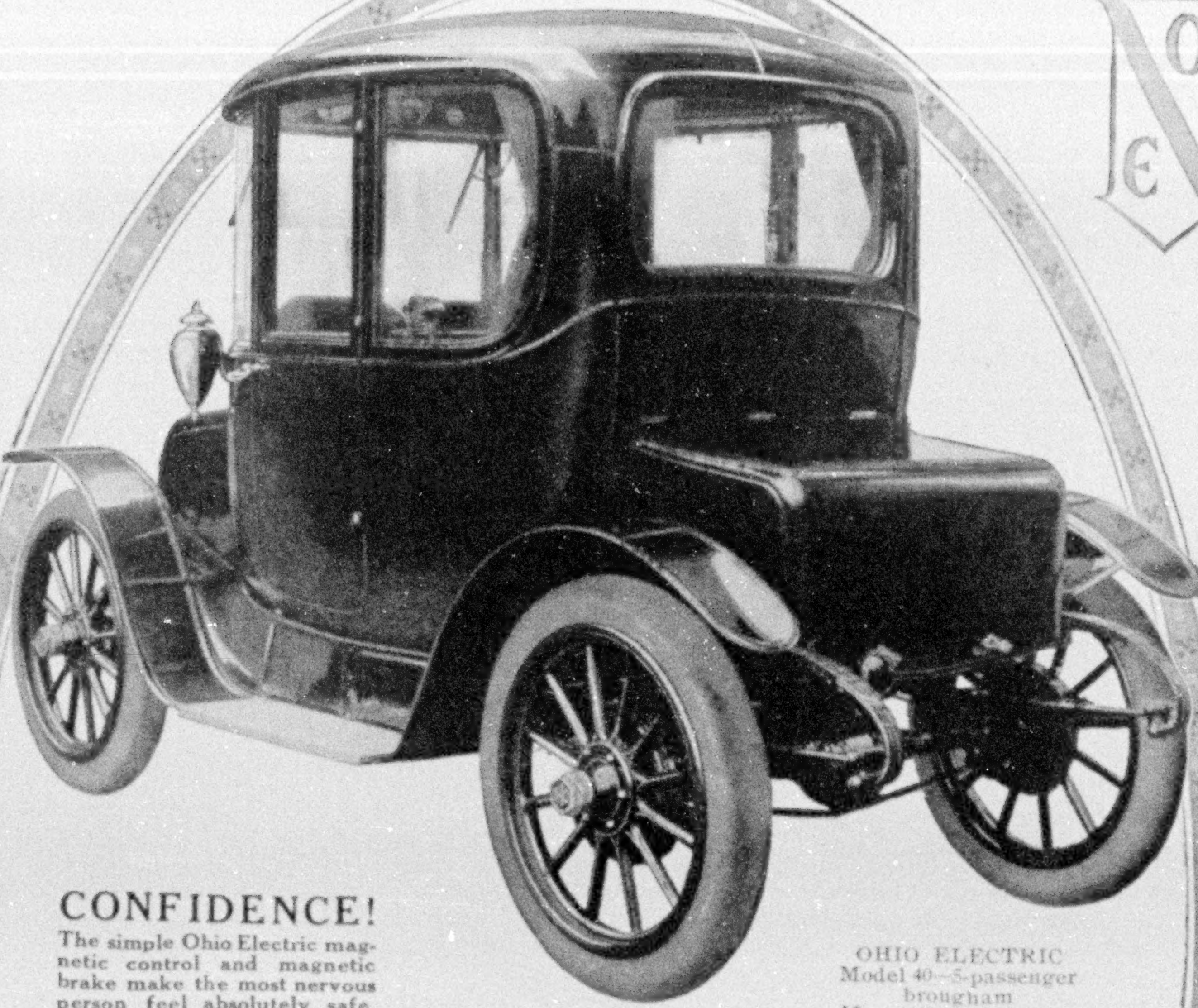
Birds Prefer RUSTIC Houses

Your choice of these houses for $1.25; three for $3.50. Parcel Post, prepaid, except outside of fourth zone add 10 per cent to amount of your order.

Write for beautifully illustrated catalogue

THE CRESCENT CO., "Birdville,"
TOMS RIVER, N. J.

Bluebird
No. 21



CONFIDENCE!

The simple Ohio Electric magnetic control and magnetic brake make the most nervous person feel absolutely safe.

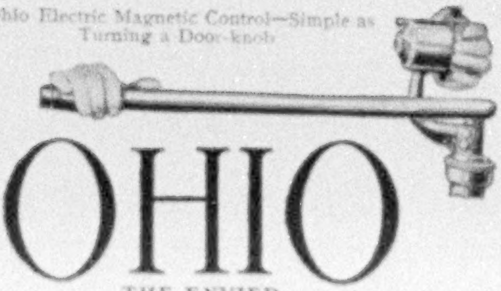
OHIO ELECTRIC
Model 40—5-passenger brougham
Magnetic control—magnetic brake

IT IS an every-day occurrence for women who have never operated an electric to step into an Ohio and drive right away with but a word of instruction.

The magnetic control and magnetic brake make this possible. Turn the control disc forward, and you go forward; backward, and you go back. The magnetic brake operates merely on pressure of a button. It is effective even on the most slippery streets. Double contracting external foot-brakes for emergency use are also a part of Ohio equipment. The double drive—now so widely imitated—is another feature originated by us.

We have been told that the present Ohio models are the most beautiful electric pleasure vehicles ever produced. But we should be pleased to have your judgment on this point, as well as on the mechanical superiority of the car. *Literature on request.*

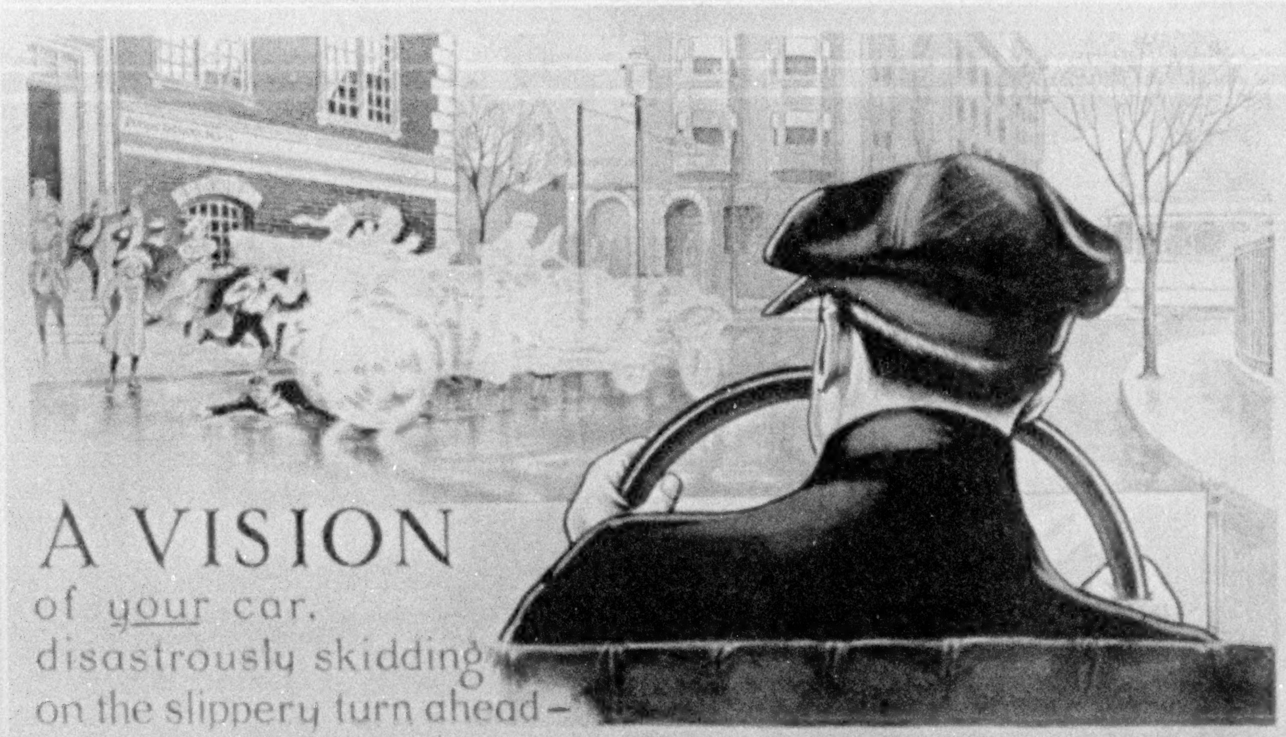
The Ohio Electric Car Co., 1527 W. Bancroft St., Toledo
Gibson Electrics, Ltd. Ontario Distributors Toronto, Canada
Gotham Motor Car Co. New York Distributors



Ohio Electric Magnetic Control—Simple as Turning a Door-knob

OHIO

THE ENVIED
ELECTRIC



You have neglected to put on Weed Chains. *You* anxiously view the slippery turn ahead and have ***a mental picture of your car skidding into the school children.***

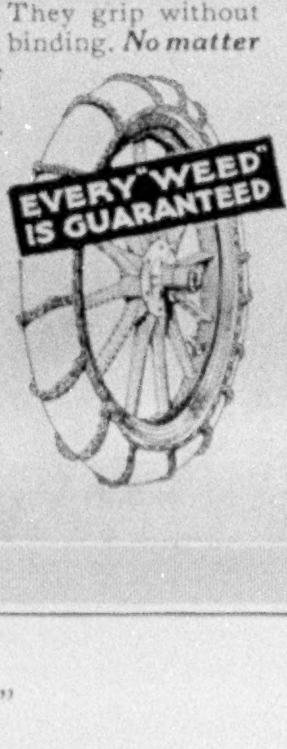
Stop nursing anxiety and coaxing calamity. For Safety's sake—for your own peace of mind fully equip your car today with

Weed Anti-Skid Chains

The Only Real Safeguard Against Skidding

Safety demands that all tires be equipped with Weed Chains. It doesn't require the gift of second sight to see why this is true. ***Rubber slips—never grips.*** Rubber will agree to anything the road has to offer. It is the weaker element. It slides on wet pavements like a cake of soap rubbed on the moistened hands. Rubber lacks the bite-and-hang-on ability to prevent skidding.

Weed Chains are diamond hard—many times harder than their opposing element the pavement or road. Wheels equipped with Weed Chains automatically lay their own traction surface. They grip without grinding—hold without binding. ***No matter how muddy or icy the road,*** they hold on like a bull-dog, prevent side-skid and drive-slip.



Weed Chains are attached in a moment without any jacks—They do not injure tires.

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The copyright notice must appear on each slide. The purchase of lantern slides does not carry with it the authority to publish the pictures and they cannot be used for advertising purposes.

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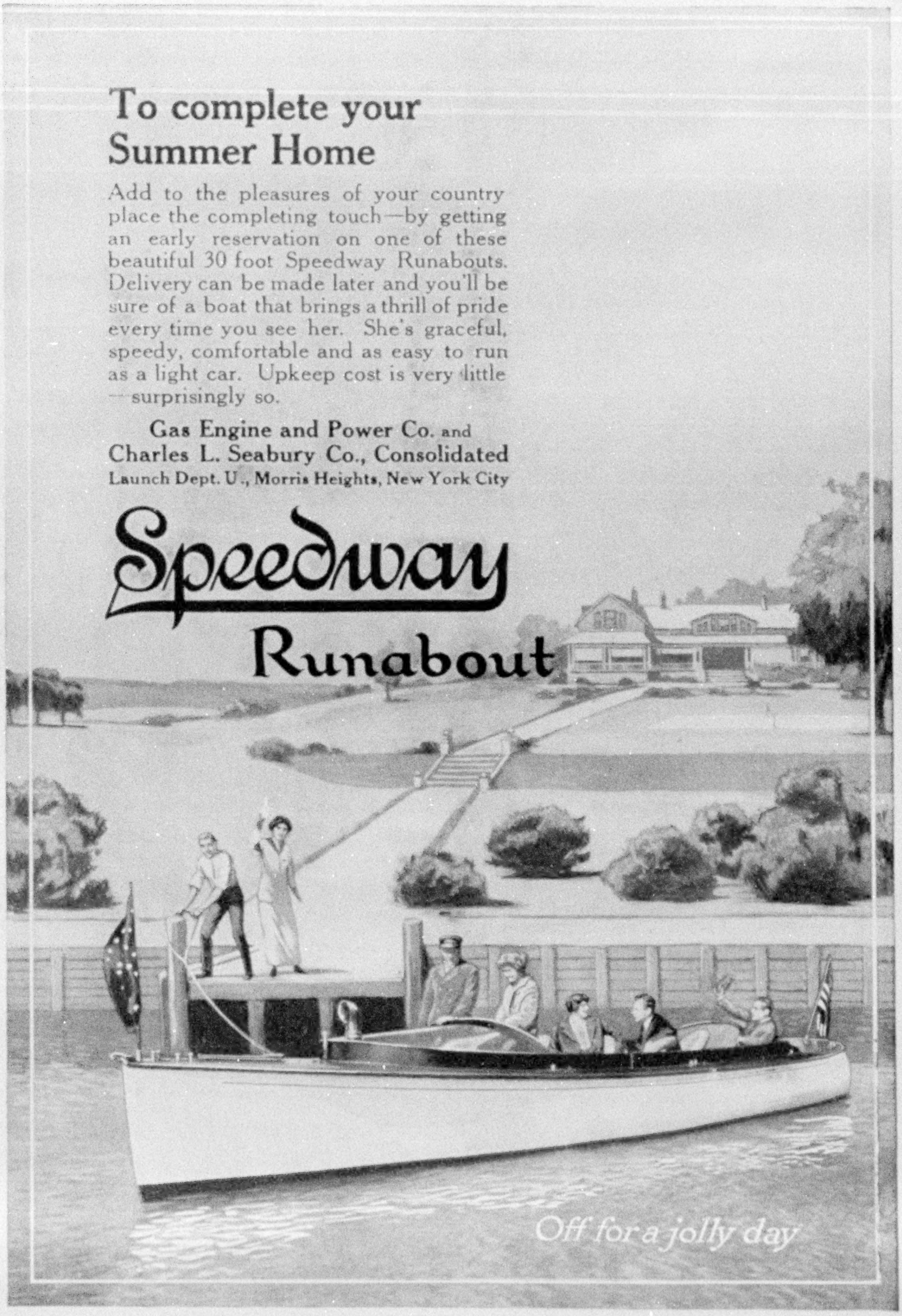

Off for a jolly day

To complete your Summer Home

Add to the pleasures of your country place the completing touch—by getting an early reservation on one of these beautiful 30 foot Speedway Runabouts. Delivery can be made later and you'll be sure of a boat that brings a thrill of pride every time you see her. She's graceful, speedy, comfortable and as easy to run as a light car. Upkeep cost is very little—surprisingly so.

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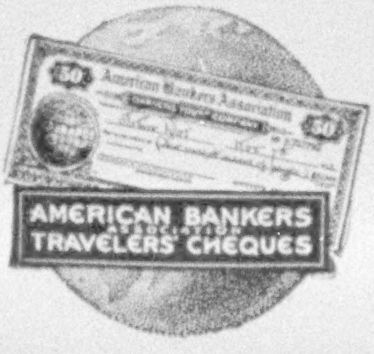
American Bankers Association
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AMERICAN BANKERS TRAVELERS' CHEQUES

"A.B.A." (American Bankers Association) Cheques are the only travelers' cheques which can be accepted, under the law, in payment of United States Customs duties.

Get them at your Bank

Ask for descriptive booklet. Or, if your bank is not yet supplied with "A. B. A." Cheques, write us for booklet and information as to where they can be obtained in your vicinity.

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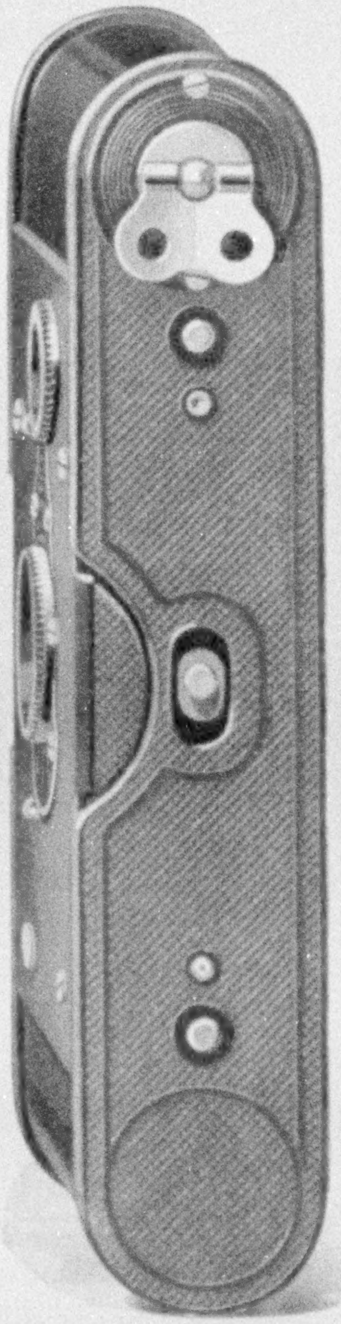
The Vest Pocket Kodak

"As right as a watch."



Actual Size.

SO small and smooth that it is pocketed without annoyance; is instantly ready for business without focusing. Fitted with Kodak Ball Bearing shutter, Autotime scale, reversible finder. Loads in daylight with Kodak film cartridges of eight exposures. Pictures 1⅝ x 2½ inches.

So accurate is this little camera that enlargements can be made from the negatives to any reasonable size, and at small cost—to the post card size (3¼ x 5½), for instance, at sixteen cents.

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Do., with Kodak Anastigmat lens, Speed *f*.8, - - - - - - -	12.00
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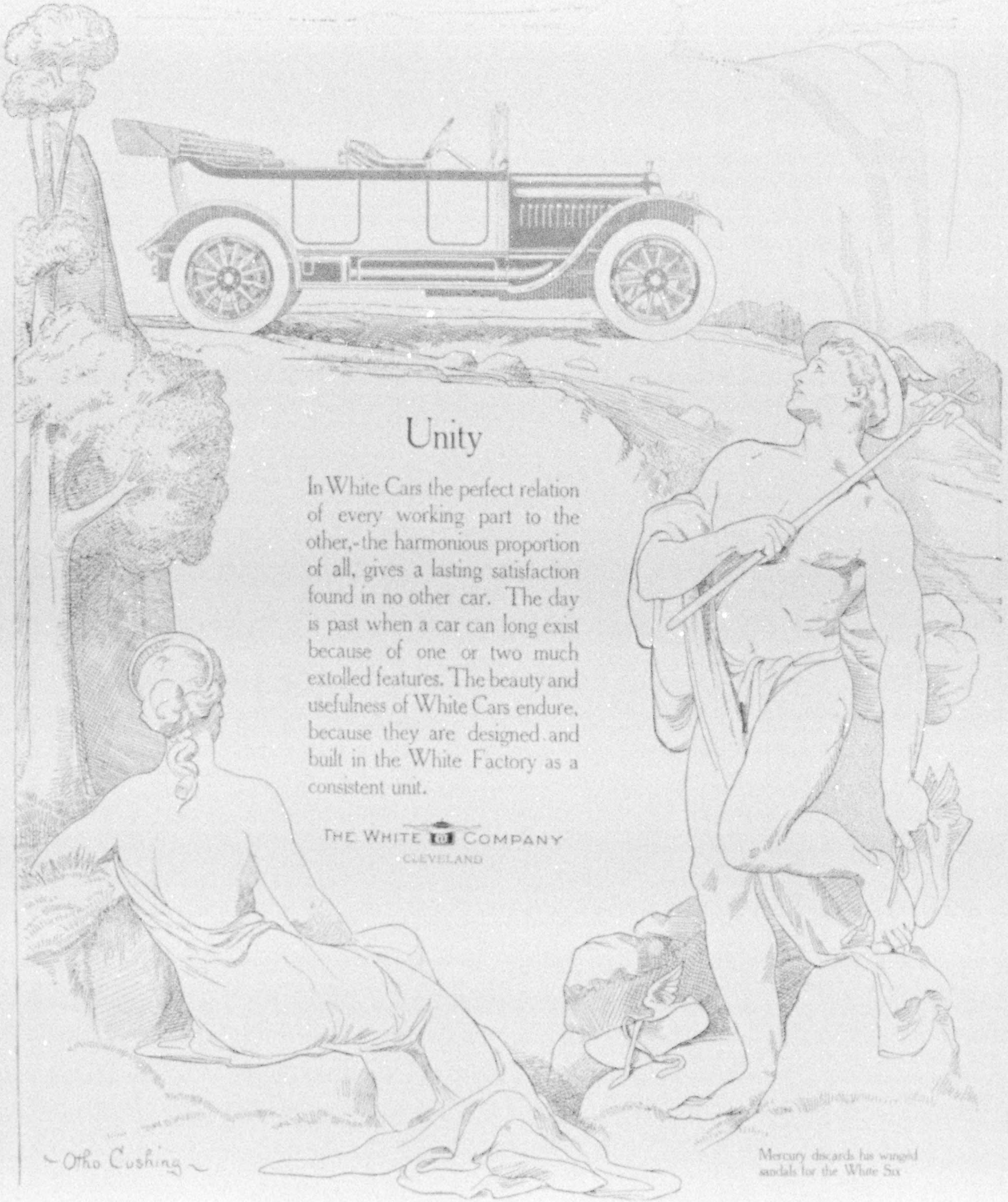
EASTMAN KODAK COMPANY,

Kodak catalogue free at your dealers, or by mail.

ROCHESTER, N. Y., *The Kodak City.*



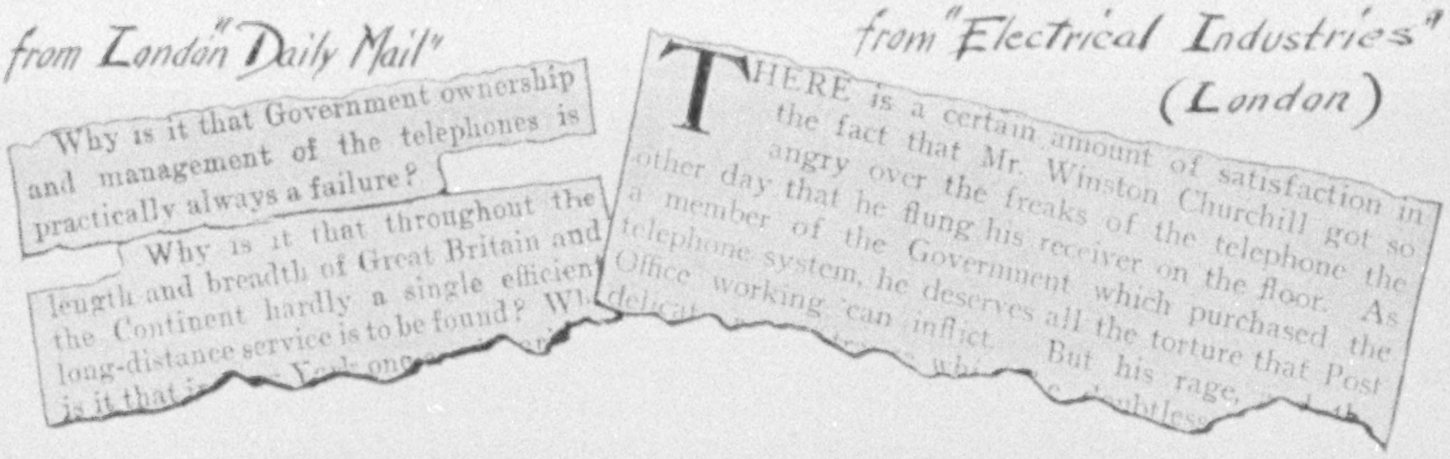
Unity

In White Cars the perfect relation of every working part to the other,-the harmonious proportion of all, gives a lasting satisfaction found in no other car. The day is past when a car can long exist because of one or two much extolled features. The beauty and usefulness of White Cars endure, because they are designed and built in the White Factory as a consistent unit.

THE WHITE COMPANY
CLEVELAND

Mercury discards his winged sandals for the White Six

America's Telephones Lead the World
Service Best—Cost Lowest


from London "Daily Mail"

Why is it that Government ownership and management of the telephones is practically always a failure?

Why is it that throughout the length and breadth of Great Britain and the Continent hardly a single efficien long-distance service is to be found? Wh is it that i York one

from "Electrical Industries" (London)

THERE is a certain amount of satisfaction in the fact that Mr. Winston Churchill got so angry over the freaks of the telephone the other day that he flung his receiver on the floor. As a member of the Government which purchased the telephone system, he deserves all the torture that Post Office working can inflict. But his rage, delicat whi doubtless

From "Le Petit Phare de Nantes," Paris

"But today I found I had to talk with Saint-Malo, and, wishing to be put through quickly, I had my name inscribed on the waiting list first thing in the morning; the operator told me—though very amiably, I must confess—that I would have to wait thirteen hours and ten minutes (you are reading it right) in order to be put through."

Herr Wendel, in The German Diet.

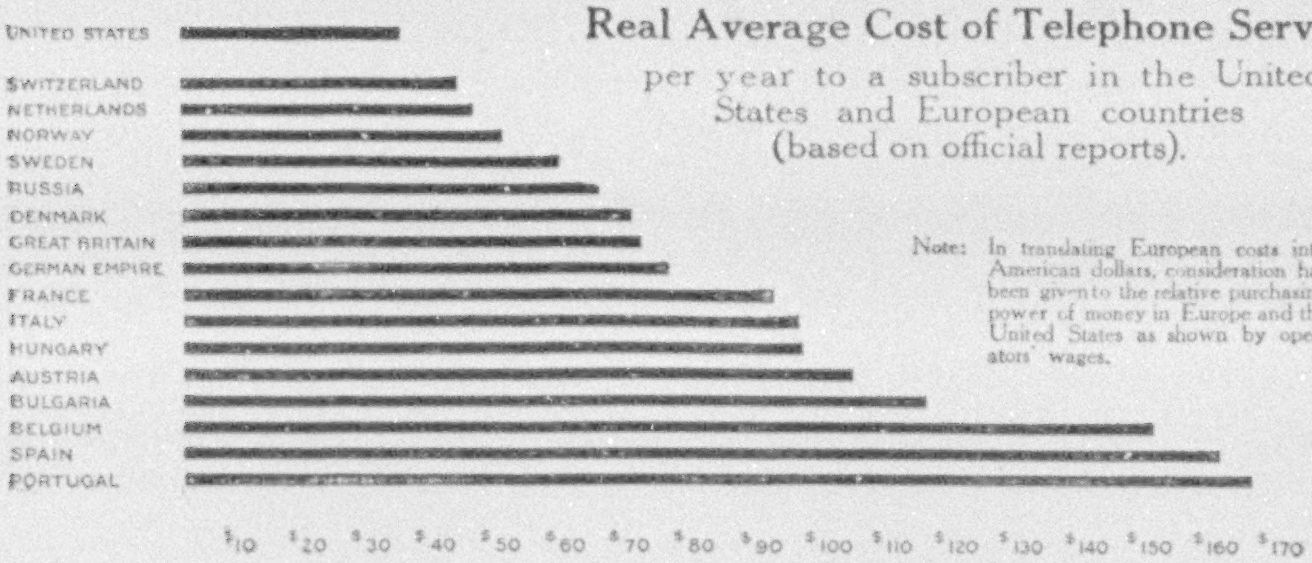
"I refer here to Freiberg. There the entire telephone service is interrupted at 9 o'clock p. m. Five minutes after 9 o'clock it is impossible to obtain a telephone connection."

Herr Haberland, Deputy, in the Reichstag

"The average time required to get a connection with Berlin is now 1½ hours. Our business life and trade suffer considerably on account of this lack of telephone facilities, which exists not only between Dusseldorf and Berlin and between Berlin and the West, but also between other towns, such as Strassburg, Antwerp, etc."

Dr. R. Luther, in the Dresdner Anzeiger

"In the year 1913, 36 years after the discovery of the electro-magnetic telephone, in the age of the beginning of wireless telegraphy, one of the largest cities of Germany, Dresden, with half a million inhabitants, is without adequate telephone facilities."



Real Average Cost of Telephone Service

per year to a subscriber in the United States and European countries (based on official reports).

Note: In translating European costs into American dollars, consideration has been given to the relative purchasing power of money in Europe and the United States as shown by operators' wages.

These are the reasons why there are twelve times as many telephones for each hundred persons in the United States as in Europe.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
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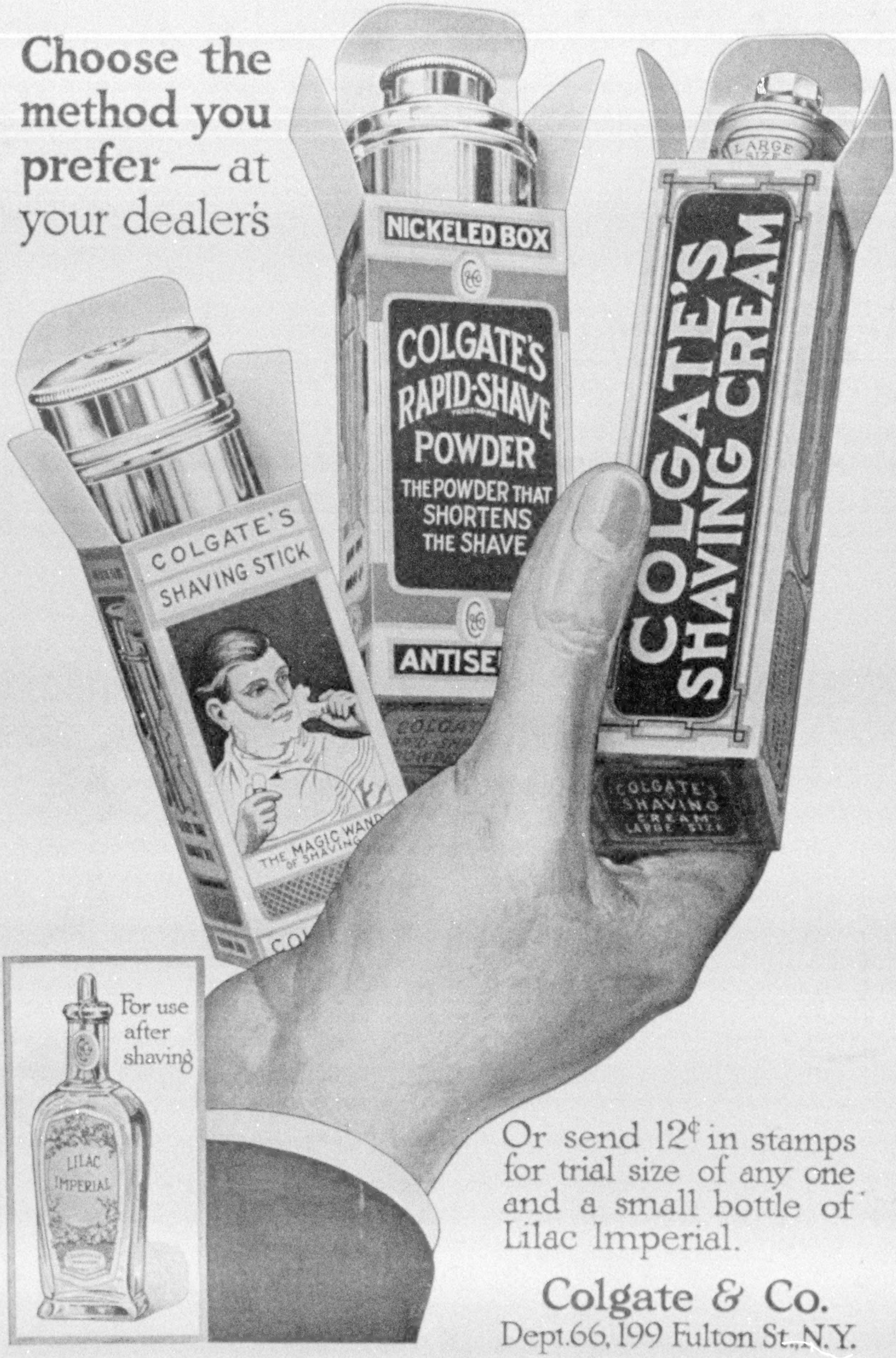
One Policy *One System* *Universal Service*

Choose the method you prefer — at your dealer's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